

5.0 WASTEWATER CHARACTERISTICS

This section summarizes the characteristics of wastewater generated by oily operations (as defined in Section 1.0) and discharged to wastewater treatment systems at MP&M facilities. In general, the MP&M industry generates oil- and organic pollutant-bearing wastewater. This wastewater exhibits high concentrations of oil and concentrations of organic pollutants. Oil-bearing wastewater is classified as containing either free (floating) oils or oil/water emulsions. These wastewaters may also contain incidental levels of metals most often in the suspended or particulate phase.

Analytical data from the MP&M sampling program, including data obtained from sanitation districts, MP&M facilities, and MP&M industry trade associations, are in the sampling episode reports located in Sections 5.2 and 15.3 of the rulemaking record. As part of the MP&M rulemaking, EPA also evaluated the following wastewaters: (1) hexavalent chromium-bearing wastewater; (2) cyanide-bearing wastewater; (3) chelated metal-bearing wastewater; and (4) metal-bearing wastewater. These additional analyses are presented in Appendix C.

This section summarizes analytical data obtained during the MP&M regulatory development process for oily operations and influents to the wastewater treatment systems. These subsections present the number of samples analyzed, the number of times each pollutant was detected, and the minimum, maximum, mean, and median pollutant concentrations. Section 5.1 discusses the oily operations that generate oil-bearing and organic pollutant-bearing wastewater and presents pollutant concentration data for the process waters and rinse waters for those oily operations. Section 5.2 characterizes the influent to oily wastewater treatment systems.

5.1 Process Water and Rinse Water

Table 5-1 lists the oily operations that generate oil-bearing and organic pollutant-bearing wastewater and presents the number of process water and rinse water samples collected for each operation during EPA's sampling program. Section 4.0 describes these operations in detail.

MP&M facilities usually use oil/water emulsions as coolants and lubricants in machining, grinding, and deformation operations. These facilities also perform alkaline cleaning operations to remove oil and grease from parts. Table 5-2 summarizes the pollutant concentration data collected during the MP&M sampling program for process water from oily operations that generate oil-bearing wastewater. Table 5-3 summarizes similar data for the associated rinse waters. The maximum concentration of oil and grease (measured as hexane extractable material (HEM)) in the process water samples was 390,000 mg/L (from an alkaline cleaning bath), while the maximum concentration of oil and grease in the rinse water samples was 9,195 mg/L.

Table 5-1**Number of Process Water and Rinse Water Samples For Oily Operations**

Unit Operation	No. of Process Water Samples^a	No. of Rinse Water Samples^a
Abrasive Blasting	3	3
Adhesive Bonding	0	0
Alkaline Cleaning for Oil Removal	34	42
Alkaline Treatment without Cyanide	18	32
Aqueous Degreasing	11	6
Corrosion Preventive Coating	8	4
Electrical Discharge Machining	1	0
Floor Cleaning (In Process Area)	6	0
Grinding	19	0
Heat Treating	3	7
Impact Deformation	1	0
Machining	14	0
Painting-spray or Brush (Including Water Curtains)	6	0
Steam Cleaning	8	0
Testing (e.g., Hydrostatic, Dye Penetrant, Ultrasonic, Magnetic Flux)	8	3
Thermal Cutting	2	0
Tumbling/Barrel Finishing/Mass Finishing/Vibratory Finishing	9	4
Washing (Finished Products)	4	3
Welding	0	1
Wet Air Pollution Control for Organic Constituents	0 ^b	0 ^b

Source: MP&M Sampling Program.

^aOily operations for which no samples were collected are rarely performed or were not observed at MP&M facilities.

^bData were transferred for this operation.

NA - Not applicable; unit operation has no associated rinse.

Table 5-2**Process Water Pollutant Concentration Data for Oily Operations**

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Organic Priority Pollutants						
1,1,1-Trichloroethane	76	1	0.011	0.011	0.011	0.011
1,1-Dichloroethane	76	0	NA	NA	NA	NA
1,1-Dichloroethene	76	0	NA	NA	NA	NA
2,4-Dimethylphenol	71	5	0.016	0.064	0.052	0.062
2,4-Dinitrophenol	75	0	NA	NA	NA	NA
2,6-Dinitrotoluene	75	0	NA	NA	NA	NA
2-Nitrophenol	76	0	NA	NA	NA	NA
4-Chloro-3-Methylphenol	75	11	0.011	91.1	18.2	0.587
4-Nitrophenol	74	1	0.424	0.424	0.424	0.424
Acenaphthene	76	0	NA	NA	NA	NA
Acrolein	73	1	0.161	0.161	0.161	0.161
Anthracene	76	1	0.193	0.193	0.193	0.193
Bis(2-ethylhexyl) Phthalate	76	18	0.015	143	8.65	0.164
Butyl Benzyl Phthalate	76	1	0.066	0.066	0.066	0.066
Chlorobenzene	76	1	0.028	0.028	0.028	0.028
Chloroethane	76	1	8.34	8.34	8.34	8.34
Chloroform	76	5	0.010	0.019	0.014	0.013
Di-n-butyl Phthalate	75	3	0.012	0.070	0.033	0.018
Di-n-octyl Phthalate	75	1	0.020	0.020	0.020	0.020
Dimethyl Phthalate	75	0	NA	NA	NA	NA
Ethylbenzene	76	4	0.028	0.594	0.239	0.167
Fluoranthene	76	4	0.029	0.243	0.132	0.129
Fluorene	75	2	0.010	0.021	0.015	0.015
Isophorone	75	0	NA	NA	NA	NA
Methylene Chloride	76	3	0.028	6.76	2.27	0.030
n-Nitrosodimethylamine	75	0	NA	NA	NA	NA

Table 5-2 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Organic Priority Pollutants (continued)						
Naphthalene	76	4	0.025	1.84	0.511	0.091
Phenanthrene	76	4	0.101	5.50	1.47	0.143
Phenol	76	21	0.012	8.84	1.28	0.103
Pyrene	76	0	NA	NA	NA	NA
Tetrachloroethene	76	2	0.015	0.021	0.018	0.018
Toluene	76	6	0.029	0.653	0.183	0.103
Trichloroethene	75	10	0.019	2.29	0.251	0.023
Metal Priority Pollutants						
Antimony	149	49	0.003	1.93	0.217	0.042
Arsenic	150	66	0.001	1.65	0.183	0.023
Beryllium	150	24	0.0005	0.025	0.004	0.002
Cadmium	154	78	0.002	12.6	1.23	0.088
Chromium	154	121	0.007	995	11.7	0.128
Copper	154	142	0.006	190	6.40	0.695
Lead	154	87	0.006	7,150	91.9	0.414
Mercury	150	33	0.0001	0.017	0.001	0.0005
Nickel	154	113	0.008	80.9	2.24	0.141
Selenium	149	41	0.001	1.57	0.087	0.024
Silver	154	48	0.001	2.12	0.138	0.014
Thallium	149	22	0.001	0.113	0.023	0.021
Zinc	154	145	0.008	1,160	27.2	1.31
Conventional Pollutants						
BOD 5-day (Carbonaceous)	65	54	3.00	64,900	3,953	837
Oil and Grease (as HEM)	102	83	1.08	390,000	13,884	390
Total Suspended Solids	153	140	4.00	110,000	2,764	172
Nonconventional Organic Pollutants						
1,4-Dioxane	76	2	0.077	1.00	0.539	0.589
1-Bromo-2-Chlorobenzene	76	0	NA	NA	NA	NA
1-Bromo-3-Chlorobenzene	76	0	NA	NA	NA	NA
1-Methylfluorene	76	3	0.014	2.60	0.912	0.123

Table 5-2 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Nonconventional Organic Pollutants (continued)						
2-Butanone	76	13	0.057	38.3	3.72	0.121
2-Hexanone	76	3	0.124	0.505	0.263	0.161
2-Isopropyl-naphthalene	76	1	7.34	7.34	7.34	7.34
2-Methylnaphthalene	76	9	0.011	3.14	0.511	0.236
2-Propanone	76	41	0.050	11.9	0.943	0.215
3,6-Dimethylphenanthrene	76	1	8.50	8.50	8.50	8.50
4-Methyl-2-Pentanone	76	10	0.052	63.7	6.73	0.358
Acetophenone	76	1	0.566	0.566	0.566	0.566
Alpha-terpineol	72	12	0.012	14.1	2.69	178
Aniline	76	0	NA	NA	NA	NA
Benzoic Acid	76	11	0.071	13.2	1.48	0.189
Benzyl Alcohol	76	2	0.094	0.208	0.151	0.151
Biphenyl	76	2	0.014	0.038	0.026	0.026
Carbon Disulfide	76	0	NA	NA	NA	NA
Dibenzofuran	76	0	NA	NA	NA	NA
Dibenzothiophene	76	0	NA	NA	NA	NA
Diphenyl Ether	76	0	NA	NA	NA	NA
Diphenylamine	76	2	0.024	0.026	0.025	0.025
Hexanoic Acid	76	24	0.019	1,490	66.6	1.17
Isobutyl Alcohol	76	3	0.012	1.31	0.446	0.018
m+p Xylene	52	2	0.013	0.352	0.183	0.183
m-Xylene	24	2	0.153	2.13	1.14	1.14
Methyl Methacrylate	76	0	NA	NA	NA	NA
n,n-Dimethylformamide	76	4	0.028	0.665	0.322	0.297
n-Decane	75	9	0.017	1.33	0.462	0.132
n-Docosane	76	23	0.013	141	7.97	0.164
n-Dodecane	76	24	0.011	36.8	3.60	0.419
n-Eicosane	76	29	0.012	14.1	1.40	0.190
n-Hexacosane	76	19	0.011	109	7.82	0.093
n-Hexadecane	76	28	0.015	95.3	6.64	0.444

Table 5-2 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Nonconventional Organic Pollutants (continued)						
n-Octacosane	76	7	0.035	61.1	11.9	0.542
n-Octadecane	76	28	0.013	264	13.1	0.198
n-Tetracosane	76	16	0.011	116	9.92	0.283
n-Tetradecane	76	30	0.011	48.5	6.31	0.753
n-Triacontane	76	12	0.012	31.9	3.89	0.666
o+p Xylene	24	2	0.063	1.48	0.774	0.774
o-Cresol	76	1	0.039	0.039	0.039	0.039
o-Xylene	52	6	0.010	0.201	0.044	0.013
p-Cresol	76	7	0.010	4.31	1.02	0.041
p-Cymene	76	2	0.021	0.051	0.036	0.036
Pyridine	76	0	NA	NA	NA	NA
Styrene	75	1	1.18	1.18	1.18	1.18
Trichlorofluoromethane	76	1	0.106	0.106	0.106	0.106
Tripropyleneglycol Methyl Ether	76	6	1.93	5,254	1,222	245
Nonconventional Metal Pollutants						
Aluminum	154	132	0.039	29,600	242	2.31
Barium	150	137	0.001	31.4	1.62	0.106
Boron	150	127	0.022	4,150	136	1.11
Calcium	150	145	0.274	11,600	200	39.0
Cobalt	150	59	0.005	35.3	0.723	0.034
Gold	3	1	1.66	1.66	1.66	1.66
Iron	154	147	0.016	2,790	49.1	4.83
Magnesium	150	139	0.088	213	26.1	11.6
Manganese	154	142	0.002	20,600	146	0.190
Molybdenum	150	100	0.003	112	2.74	0.122
Sodium	150	147	1.61	152,000	4,908	297
Tin	154	64	0.004	1,830	30.5	0.080
Titanium	150	105	0.002	59.7	0.886	0.040
Vanadium	150	64	0.002	1.07	0.095	0.023

Table 5-2 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Other Nonconventional Pollutants						
Ammonia as Nitrogen	47	41	0.160	2,340	82.2	1.76
Chemical Oxygen Demand (COD)	109	103	6.90	330,000	25,354	4,800
Chloride	62	59	2	14,400	482	137
Cyanide	9	7	0.004	0.232	0.078	0.059
Fluoride	69	66	0.130	190	6.00	1.10
Hexavalent Chromium	61	16	0.016	1.70	0.185	0.065
Sulfate	86	72	1.50	46,000	1,793	121
Total Dissolved Solids	146	146	33.5	411,420	25,197	4,200
Total Kjeldahl Nitrogen	45	42	0.200	2,830	167	34.9
Total Organic Carbon (TOC)	72	68	4.26	85,300	8,280	666
Total Petroleum Hydrocarbons (as SGT-HEM)	69	47	6.55	6,230	489	46.0
Total Phosphorus	39	37	0.051	7,170	276	11.0
Total Recoverable Phenolics	109	92	0.006	33.8	1.53	0.160
Total Sulfide	16	5	1.00	11.0	4.40	2.00

Source: MP&M Sampling Program.

^aDue to budgetary constraints, EPA did not analyze all samples for all pollutants.

NA - Not applicable.

Table 5-3**Rinse Water Pollutant Concentration Data for Oily Operations**

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Organic Priority Pollutants						
1,1-Dichloroethane	62	1	0.039	0.039	0.039	0.039
1,1-Dichloroethene	62	0	NA	NA	NA	NA
1,1,1-Trichloroethane	62	1	0.023	0.023	0.023	0.023
2-Nitrophenol	62	0	NA	NA	NA	NA
2,4-Dimethylphenol	48	0	NA	NA	NA	NA
2,4-Dinitrophenol	59	0	NA	NA	NA	NA
2,6-Dinitrotoluene	62	1	0.616	0.616	0.616	0.616
4-Chloro-3-Methylphenol	60	2	0.023	0.050	0.037	0.037
4-Nitrophenol	60	0	NA	NA	NA	NA
Acenaphthene	62	0	NA	NA	NA	NA
Acrolein	53	0	NA	NA	NA	NA
Anthracene	62	0	NA	NA	NA	NA
Bis(2-ethylhexyl) Phthalate	62	8	0.011	1.15	0.417	0.327
Butyl Benzyl Phthalate	62	0	NA	NA	NA	NA
Chlorobenzene	62	0	NA	NA	NA	NA
Chloroethane	62	0	NA	NA	NA	NA
Chloroform	62	17	0.010	0.081	0.021	0.016
Di-n-octyl Phthalate	62	0	NA	NA	NA	NA
Di-n-butyl Phthalate	62	1	0.017	0.017	0.017	0.017
Dimethyl Phthalate	62	0	NA	NA	NA	NA
Ethylbenzene	62	1	0.039	0.039	0.039	0.039
Fluoranthene	62	0	NA	NA	NA	NA
Fluorene	62	0	NA	NA	NA	NA
Isophorone	62	0	NA	NA	NA	NA
Methylene Chloride	62	1	0.016	0.016	0.016	0.016
n-Nitrosodiphenylamine	62	0	NA	NA	NA	NA
n-Nitrosodimethylamine	62	0	NA	NA	NA	NA

Table 5-3 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Organic Priority Pollutants (continued)						
Phenanthrene	62	1	0.527	0.527	0.527	0.527
Phenol	62	4	0.010	8.28	2.14	0.132
Pyrene	62	0	NA	NA	NA	NA
Tetrachloroethene	62	0	NA	NA	NA	NA
Toluene	62	2	0.011	0.045	0.028	0.028
Trichloroethene	62	9	0.011	0.022	0.017	0.018
Metal Priority Pollutants						
Antimony	99	20	0.003	0.256	0.051	0.037
Arsenic	100	30	0.001	0.303	0.044	0.009
Beryllium	100	5	0.001	0.005	0.002	0.002
Cadmium	104	30	0.002	11.9	0.432	0.012
Chromium	104	60	0.001	104	1.97	0.082
Copper	104	88	0.008	14.7	0.942	0.247
Lead	104	24	0.002	6.89	0.759	0.050
Mercury	100	14	0.0001	0.002	0.001	0.0003
Nickel	104	50	0.001	10.3	0.434	0.099
Selenium	99	9	0.001	0.232	0.056	0.022
Silver	104	29	0.001	0.118	0.022	0.011
Thallium	99	12	0.001	0.036	0.008	0.002
Zinc	104	85	0.009	46.7	1.89	0.110
Conventional Pollutants						
BOD 5-day (Carbonaceous)	51	42	3.04	12,900	730	47.0
Oil and Grease (as HEM)	75	47	1.12	9,195	348	25.5
Total Suspended Solids	102	77	5.00	2,560	201	65.0
Nonconventional Organic Pollutants						
1-Bromo-2-Chlorobenzene	62	0	NA	NA	NA	NA
1-Bromo-3-Chlorobenzene	62	0	NA	NA	NA	NA
1-Methylfluorene	62	1	0.129	0.129	0.129	0.129
1-Methylphenanthrene	62	1	1.02	1.02	1.02	1.02
1,4-Dioxane	62	1	2.02	2.02	2.02	2.02

Table 5-3 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Nonconventional Organic Pollutants (continued)						
2-Hexanone	62	0	NA	NA	NA	NA
2-Isopropyl-naphthalene	62	1	1.57	1.57	1.57	1.57
2-Methylnaphthalene	62	1	1.10	1.10	1.10	1.10
2-Propanone	62	8	0.065	3.10	0.655	0.390
3,6-Dimethylphenanthrene	62	1	0.811	0.811	0.811	0.811
4-Methyl-2-Pentanone	62	0	NA	NA	NA	NA
Acetophenone	62	0	NA	NA	NA	NA
Alpha-Terpineol	52	2	65.3	67.3	66.3	66.3
Aniline	62	0	NA	NA	NA	NA
Benzoic Acid	62	7	0.122	6.61	2.03	1.45
Benzyl Alcohol	62	2	2.73	24.8	13.8	13.8
Biphenyl	62	0	NA	NA	NA	NA
Carbon Disulfide	62	2	0.062	0.354	0.208	0.208
Dibenzofuran	62	1	0.010	0.010	0.010	0.010
Dibenzothiophene	62	0	NA	NA	NA	NA
Diphenyl Ether	62	0	NA	NA	NA	NA
Diphenylamine	62	0	NA	NA	NA	NA
Hexanoic Acid	62	20	0.013	28.4	1.84	0.189
Isobutyl Alcohol	62	0	NA	NA	NA	NA
m-xylene	13	0	NA	NA	NA	NA
m+p Xylene	49	1	0.104	0.104	0.104	0.104
Methyl Methacrylate	62	0	NA	NA	NA	NA
n-Eicosane	62	13	0.011	2.41	0.490	0.172
n-Decane	62	1	5.01	5.01	5.01	5.01
n-Docosane	62	8	0.018	6.47	0.964	0.039
n-Dodecane	62	6	1.77	53.3	15.3	7.24
n-Hexacosane	62	6	0.011	1.46	0.512	0.268
n-Hexadecane	62	9	0.011	52.7	12.2	1.27
n-Octacosane	62	3	0.396	1.37	0.818	0.684
n-Octadecane	62	10	0.018	4.03	0.952	0.159

Table 5-3 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Nonconventional Organic Pollutants (continued)						
n–Tetradecane	62	8	0.011	160	40.0	1.07
n-Titrosopiperidine	62	0	NA	NA	NA	NA
n-Triacontane	62	2	0.039	0.322	0.180	0.180
n,n-Dimethylformamide	62	1	0.011	0.011	0.011	0.011
o-Cresol	62	1	0.012	0.012	0.012	0.012
o-Xylene	49	1	0.056	0.056	0.056	0.056
o+p Xylene	13	0	NA	NA	NA	NA
p-Cresol	62	3	0.014	0.063	0.030	0.014
p-Cymene	62	1	0.190	0.190	0.190	0.190
Pyridine	62	0	NA	NA	NA	NA
Styrene	62	0	NA	NA	NA	NA
Trichlorofluoromethane	62	1	0.036	0.036	0.036	0.036
Tripropyleneglycol Methyl Ether	62	3	0.413	4.18	2.43	2.71
Nonconventional Metal Pollutants						
Aluminum	104	66	0.060	321	12.9	0.389
Barium	100	86	0.001	1.61	0.134	0.032
Boron	100	66	0.012	838	36.6	0.223
Calcium	100	91	0.050	175	36.1	20.8
Cobalt	100	19	0.005	0.627	0.115	0.024
Gold	7	3	0.056	0.086	0.074	0.081
Iron	104	77	0.011	453	14.2	0.418
Magnesium	100	87	0.066	37.3	9.12	6.36
Manganese	104	79	0.001	135	4.07	0.043
Molybdenum	100	41	0.008	187	4.71	0.045
Sodium	100	99	1.63	19,100	524	113
Tin	104	31	0.006	16.3	1.22	0.042
Titanium	100	43	0.001	1.85	0.206	0.014
Vanadium	100	23	0.001	0.182	0.026	0.014

Table 5-3 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Other Nonconventional Pollutants						
Ammonia as Nitrogen	30	14	0.020	10.1	2.01	0.125
Chemical Oxygen Demand (COD)	65	58	5.20	32,700	1,690	175
Chloride	21	21	3.00	64,500	3,128	30.0
Cyanide	2	2	0.010	1.45	0.730	0.730
Fluoride	22	20	0.300	135	7.50	0.705
Hexavalent Chromium	54	15	0.011	0.590	0.067	0.022
Sulfate	48	39	2.33	780	96.0	34.8
Total Dissolved Solids	100	99	26.0	120,000	2,955	756
Total Kjeldahl Nitrogen	23	12	0.310	149	16.2	3.25
Total Organic Carbon (TOC)	64	60	1.72	10,100	490	83.5
Total Petroleum Hydrocarbons (as SGT-HEM)	62	29	5.00	7,367	317	27.0
Total Phosphorus	10	9	0.060	720	85.5	7.30
Total Recoverable Phenolics	63	43	0.005	0.800	0.110	0.050
Total Sulfide	11	1	12.0	12.0	12.0	12.0

Source: MP&M Sampling Program.

^aDue to budgetary constraints, EPA did not analyze all samples for all pollutants.

NA - Not applicable.

As shown in Tables 5-2 and Table 5-3, oil-bearing process water and rinses also contain numerous organic pollutants. These pollutants are either components of the oil/water emulsions or pollutants in the aqueous cleaning solutions. The maximum organic pollutant concentration found in process water samples was 5,245 mg/L for tripropyleneglycol methyl ether from a testing unit operation. The maximum organic pollutant concentration in the rinse water samples was 160 mg/L for n-tetradecane in the rinse water for a testing unit operation. EPA also measured the concentration of chemical oxygen demand (COD) in oil-bearing wastewater. The maximum COD concentration found in process water and rinse water samples was 330,000 mg/L and 32,700 mg/L, respectively. Data in Tables 5-2 and 5-3 show that the process water samples also contained conventional, nonconventional, and metal pollutants.

In general, the organic pollutants that EPA detected most frequently were those associated with petroleum products used in the MP&M industry (e.g., long, straight-chain organic pollutants associated with oil-based machining and grinding coolants and lubricants). EPA also detected additional organic cleaners and solvents (e.g., phenol, 2-propanone, bis(2-ethylhexyl) phthalate, and hexanoic acid). EPA also detected numerous metals in the oil-bearing waste streams. However, when compared to the metals concentrations detected in metal-bearing waste streams (see Appendix C), the oil-bearing waste streams contained lower median metals concentrations. While some specific oil-bearing wastewater streams may contain elevated concentrations of specific metals (e.g., machining of a copper part will generate copper-bearing wastewater), these streams are typically lower-flow streams as compared to other oil-bearing streams, resulting in lower treatment influent metals concentrations. These wastewaters may also contain incidental levels of metals most often in the suspended or particulate phase.

5.2 Influent to Oily Wastewater Treatment Systems

Wastewater containing oil and organic pollutants generated in the oily operations listed in Table 5-1 generally require treatment to separate oil from the wastewater. Benzene, toluene, ethylbenzene, and xylenes (BTEX) and other light hydrocarbons, for example, are moderately soluble in process waters and rinse waters. If the oils are free or floating, a technology such as oil skimming or ultrafiltration can separate the oil and water. If the oil is emulsified, techniques such as chemical emulsion breaking may be required before physical separation (see Section 8.4.5). Oil/water separation technologies remove organic pollutants that are more soluble in oil than in water from the wastewater. Table 5-4 summarizes the MP&M pollutant concentration data for the influent to oil/water separation, ultrafiltration, and dissolved air flotation treatment systems. The influent-to-treatment concentrations are typically lower than the concentrations of process and rinse water due to the number of high-flow, low-concentration rinses that are commingled prior to treatment.

Table 5-4

**MP&M Pollutant Concentration Data for the Influent to
Oily Wastewater Treatment Systems**

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Organic Priority Pollutants						
1,1-Dichloroethane	93	1	0.011	0.011	0.011	0.011
1,1-Dichloroethylene	93	0	NA	NA	NA	NA
1,1,1-Trichloroethane	93	4	0.006	0.022	0.013	0.012
2,4-Dimethylphenol	92	2	0.017	0.270	0.144	0.144
2,4-Dinitrophenol	79	0	NA	NA	NA	NA
2,6-Dinitrotoluene	93	0	NA	NA	NA	NA
2-Nitrophenol	93	1	0.025	0.025	0.025	0.025
4-Chloro-m-Cresol	93	20	0.247	3,834	637	73.9
4-Nitrophenol	85	0	NA	NA	NA	NA
Acenaphthene	93	5	0.006	1.82	0.396	0.025
Acrolein	88	1	0.168	0.168	0.168	0.168
Anthracene	93	1	0.007	0.007	0.007	0.007
Benzyl Butyl Phthalate	92	7	0.024	2.73	0.440	0.065
Bis(2-ethylhexyl) Phthalate	92	73	0.007	216	5.82	0.173
Chlorobenzene	93	0	NA	NA	NA	NA
Chloroethane	93	0	NA	NA	NA	NA
Chloroform	93	6	0.010	0.038	0.019	0.016
Di-n-butyl Phthalate	92	9	0.011	0.193	0.079	0.059
Di-n-octyl Phthalate	93	10	0.013	19.7	2.37	0.332
Dimethyl Phthalate	89	0	NA	NA	NA	NA
Ethylbenzene	94	19	0.010	14.0	0.798	0.040
Fluoranthene	92	0	NA	NA	NA	NA
Fluorene	93	7	0.010	9.93	1.47	0.034
Isophorone	89	0	NA	NA	NA	NA
Methylene Chloride	93	0	NA	NA	NA	NA
n-Nitrosodimethylamine	89	0	NA	NA	NA	NA

Table 5-4 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Organic Priority Pollutants (continued)						
Naphthalene	93	15	0.010	8.91	1.04	0.075
Phenanthrene	93	18	0.012	5.30	0.459	0.030
Phenol	92	41	0.020	27.1	1.09	0.136
Pyrene	92	2	0.031	1.01	0.521	0.521
Tetrachloroethene	93	1	0.006	0.006	0.006	0.006
Toluene	94	23	0.006	14.0	0.795	0.040
Trichloroethylene	93	0	NA	NA	NA	NA
Metal Priority Pollutants						
Antimony	97	38	0.002	0.234	0.030	0.022
Arsenic	97	46	0.002	0.534	0.048	0.006
Beryllium	97	20	0.0002	0.187	0.036	0.002
Cadmium	101	67	0.002	12.1	0.744	0.023
Chromium	101	85	0.003	15.9	0.630	0.063
Copper	101	101	0.027	232	19.7	0.407
Lead	101	74	0.006	210	16.2	0.247
Mercury	97	23	0.0001	0.003	0.001	0.0007
Nickel	101	77	0.012	18.4	0.870	0.172
Selenium	97	14	0.001	0.124	0.027	0.008
Silver	101	18	0.004	2.80	0.273	0.022
Thallium	97	6	0.001	0.068	0.012	0.001
Zinc	101	98	0.123	664	22.7	1.66
Conventional Pollutants						
BOD 5-Day (Carbonaceous)	82	74	4.00	34,800	3,137	641
Oil and Grease (as HEM)	97	95	8.33	261,500	10,686	848
Total Suspended Solids	101	99	6.00	100,000	3,251	275
Nonconventional Organic Pollutants						
1-Bromo-2-Chlorobenzene	88	0	NA	NA	NA	NA
1-Bromo-3-Chlorobenzene	88	0	NA	NA	NA	NA
1-Methylfluorene	88	12	0.010	1.72	0.188	0.019

Table 5-4 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Nonconventional Organic Pollutants (continued)						
1,4-Dioxane	88	2	0.069	0.465	0.267	0.267
2-Butanone	88	13	0.073	6.18	1.22	0.308
2-Hexanone	88	2	0.505	0.512	0.509	0.509
2-Isopropyl-naphthalene	88	2	0.421	3.49	1.96	1.96
2-Methylnaphthalene	89	21	0.011	440	21.9	0.099
2-Propanone	88	74	0.060	28.8	3.84	0.670
3,6-Dimethylphenanthrene	88	5	0.013	1.28	0.583	0.371
4-Methyl-2-Pentanone	88	13	0.072	6.72	0.660	0.113
Acetophenone	88	3	0.014	0.092	0.051	0.047
Alpha-terpineol	88	33	0.011	189	19.4	1.43
Aniline	88	1	0.014	0.014	0.014	0.014
Benzoic Acid	88	4	0.098	0.522	0.315	0.320
Benzyl Alcohol	88	7	0.011	10.8	1.63	0.141
Biphenyl	88	10	0.014	1.54	0.226	0.060
Carbon Disulfide	88	5	0.045	0.466	0.312	0.369
Dibenzofuran	88	2	0.014	0.018	0.016	0.016
Dibenzothiophene	87	3	0.015	1.29	0.452	0.048
Diphenyl Ether	88	0	NA	NA	NA	NA
Diphenylamine	88	4	0.738	1.99	1.54	1.71
Hexanoic Acid	88	34	0.011	31.9	4.27	0.561
Isobutyl Alcohol	88	0	NA	NA	NA	NA
m+p Xylene	40	10	0.038	0.241	0.125	0.139
m-Xylene	48	6	0.018	0.312	0.071	0.024
Methyl Methacrylate	88	0	NA	NA	NA	NA
n,n-Dimethylformamide	88	2	0.014	0.023	0.019	0.019
n-Decane	88	36	0.011	27.7	2.65	0.130
n-Docosane	88	44	0.012	79.7	2.78	0.125
n-Dodecane	88	52	0.017	207	21.0	0.594
n-Eicosane	87	59	0.010	109	5.95	0.217
n-Hexacosane	88	34	0.011	217	8.54	0.134

Table 5-4 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Nonconventional Organic Pollutants (continued)						
n-Nitrosopiperidine	88	0	NA	NA	NA	NA
n-Octacosane	88	10	0.031	70.7	12.9	0.266
n-Octadecane	88	67	0.011	162	5.66	0.214
n-Tetracosane	87	32	0.011	56.8	3.29	0.248
n-Tetradecane	88	64	0.011	243	15.0	0.203
n-Triacontane	87	11	0.016	25.6	5.15	1.21
o+p Xylene	48	6	0.011	0.030	0.021	0.021
o-Cresol	88	0	NA	NA	NA	NA
o-Xylene	40	12	0.012	0.130	0.059	0.046
p-Cresol	88	7	0.018	1.09	0.413	0.287
p-Cymene	88	12	0.015	14.6	1.29	0.052
Pyridine	88	15	0.014	3.42	1.02	0.063
Styrene	88	0	NA	NA	NA	NA
Trichlorofluoromethane	93	0	NA	NA	NA	NA
Tripropyleneglycol Methyl Ether	88	14	0.447	1,680	328	4.96
Nonconventional Metal Pollutants						
Aluminum	97	82	0.076	134	13.0	2.48
Barium	97	96	0.006	32.0	1.89	0.217
Boron	97	95	0.057	686	34.0	5.50
Calcium	97	96	0.154	2,200	156	41.0
Cobalt	97	41	0.008	1.22	0.203	0.102
Gold	2	1	2.81	2.81	2.81	2.81
Iron	97	95	0.604	940	47.7	10.6
Magnesium	97	94	0.180	255	36.1	12.9
Manganese	101	99	0.031	29.0	1.68	0.349
Molybdenum	101	80	0.003	40.3	1.25	0.088
Sodium	97	96	1.19	2,030	397	181
Tin	101	58	0.003	85.2	3.05	0.053
Titanium	97	72	0.003	1.80	0.228	0.081
Vanadium	97	48	0.004	0.482	0.054	0.019

Table 5-4 (Continued)

Pollutant	No. of Samples Analyzed ^a	No. of Detects	Concentration (mg/L)			
			Minimum	Maximum	Mean	Median
Other Nonconventional Pollutants						
Amenable Cyanide	4	0	NA	NA	NA	NA
Ammonia as Nitrogen	15	15	0.021	160	32.7	0.500
Chemical Oxygen Demand (COD)	96	96	30.0	213,000	23,722	5,660
Chloride	11	11	22.0	450	83.1	27.0
Cyanide	4	2	0.006	0.007	0.007	0.007
Fluoride	16	16	0.500	17.0	2.54	1.00
Hexavalent Chromium	78	12	0.011	1.74	0.212	0.020
Sulfate	39	38	16.0	176,000	13,957	405
Total Dissolved Solids	93	93	70.0	88,800	9,341	2,450
Total Kjeldahl Nitrogen	15	15	0.840	1,500	222	3.10
Total Organic Carbon (TOC)	81	79	7.66	106,000	6,181	1,340
Total Petroleum Hydrocarbons (as SGT-HEM)	81	75	5.07	25,431	1,941	507
Total Phosphorus	24	24	0.160	240	38.9	25.6
Total Recoverable Phenolics	95	91	0.005	1,360	58.6	0.240
Total Sulfide	27	24	2.00	18.0	7.13	5.50

Source: MP&M Sampling Program.

^aDue to budgetary constraints, EPA did not analyze all samples for all pollutants.

NA - Not applicable.

6.0 INDUSTRY SUBCATEGORIZATION

This section discusses the subcategorization evaluated for the final rule (MP&M Point Source Category). Section 6.1 discusses the methodology and factors considered when determining the subcategories evaluated for the final rule. Section 6.2 describes the types of facilities included in each subcategory evaluated for the final rule.

As discussed below, EPA proposed effluent limitations and standards for eight subcategories. However, for reasons discussed in Section 9.0 and Section VI of the preamble to the final rule, the final rule only establishes effluent limitations guidelines and standards for new and existing direct dischargers in one subcategory: Oily Wastes (40 CFR 438, Subpart A).

6.1 Methodology and Factors Considered for Basis of Subcategorization

In order to address variations between products, raw materials processed, and other factors that result in distinctly different effluent characteristics, EPA proposed eight groupings called “subcategories” for the January 2001 proposal and June 2002 Notice of Data Availability (NODA). EPA retained this subcategory structure for evaluating options for the final rule. Regulation of a category using subcategories allows each subcategory to have a uniform set of effluent limitations that take into account technological achievability and economic impacts unique to that subcategory. The Clean Water Act (CWA) requires EPA, in developing effluent limitations guidelines and pretreatment standards, to consider a number of different subcategorization factors. The statute also authorizes EPA to take into account other factors the Agency deems appropriate. EPA considered the following factors in evaluating the eight subcategories for the final rule:

- Unit operation;
- Activity;
- Raw materials;
- Products;
- Size of site;
- Geographic location;
- Facility age;
- Nature of the waste generated;
- Economic impacts;
- Treatment costs;
- Total energy requirements;
- Air pollution control methods; and
- Solid waste generation and disposal.

As a result of this evaluation, EPA retained the eight subcategories for evaluating options for the final rule as shown in Table 6-1.

Table 6-1**Final Subcategories Evaluated in the Final Rule**

Facilities that Generate Metal-Bearing Wastewater (With or Without Oil-Bearing Wastewater)	Facilities that Generate Only Oil-Bearing Wastewater
General Metals ^a	Oily Wastes
Metal Finishing Job Shops ^a	Railroad Line Maintenance ^a
Non-Chromium Anodizing ^a	Shipbuilding Dry Dock ^a
Printed Wiring Board ^a	
Steel Forming and Finishing ^a	

^aFor reasons discussed in Section 9.0 and Section VI of the preamble to the final rule, EPA did not establish effluent guidelines for these subcategories.

6.1.1 Factors Contributing to the Subcategorization Structure Evaluated for the Final Rule

As discussed in Section 5.0 and Appendix C, facilities performing proposed MP&M operations¹ generate two basic types of waste streams: (1) wastewater with relatively high metals content (metal-bearing, including hexavalent chromium-bearing and cyanide-bearing), and (2) wastewater with relatively low metals content and/or relatively high oil and grease content (oil-bearing). The type of wastewater a facility generates is directly related to the unit operations it performs. For example, unit operations such as machining, grinding, aqueous degreasing, and impact or pressure deformation tend to generate a wastewater with relatively high oil and grease (and associated organic pollutants) loadings but relatively low concentrations of metal pollutants. Other unit operations such as electroplating, conversion coating, chemical etching and milling, and anodizing generate higher metals loadings with moderate or low oil and grease concentrations or generate wastewater containing both metals and oil and grease. EPA defined “oily operations” in the final rule (see 40 CFR 438.2(f) and Appendix B to Part 438) and these final MP&M operations are listed in Table 6-2. EPA defined “metal-bearing operations” in the final rule (see 40 CFR 438.2(d) and Appendix C to Part 438) and these proposed MP&M operations are listed in Table 6-3.

¹EPA evaluated a number of unit operations for the May 1995 proposal, January 2001 proposal, and June 2002 NODA (see Tables 6-2 and 6-3). However, EPA selected a subset of these unit operations for regulation in the final rule (see Section 1.0). For this section, the term “proposed MP&M operations” means those operations evaluated for the two proposals, NODA, and final rule. The term “final MP&M operations” means those operations defined as “oily operations” (see Section 1.0, 40 CFR 438.2(f), and Appendix B to Part 438) and regulated by the final rule.

Table 6-2**Oily Operations as Defined by the Final Rule**

• Abrasive Blasting	• Iron Phosphate Conversion Coating
• Adhesive Bonding	• Machining
• Alkaline Cleaning for Oil Removal	• Painting-spray or Brush (Including Water Curtains)
• Alkaline Treatment Without Cyanide	• Polishing
• Aqueous Degreasing	• Pressure Deformation
• Assembly/Disassembly	• Solvent Degreasing
• Burnishing	• Steam Cleaning
• Calibration	• Testing (e.g., Hydrostatic, Dye Penetrant, Ultrasonic, Magnetic Flux)
• Corrosion Preventive Coating	• Thermal Cutting
• Electrical Discharge Machining	• Tumbling/Barrel Finishing/Mass Finishing/Vibratory Finishing
• Floor Cleaning (In Process Area)	• Washing (Finished Products)
• Grinding	• Welding
• Heat Treating	• Wet Air Pollution Control for Organic Constituents
• Impact Deformation	

Note: This list is replicated at 40 CFR 438.2(f) with definitions at Appendix B to Part 438.

Table 6-3**Metal-Bearing Operations as Defined by the Final Rule**

• Abrasive Jet Machining	• Mechanical and Vapor Plating
• Acid Pickling Neutralization	• Metallic Fiber Cloth Manufacturing
• Acid Treatment With Chromium	• Metal Spraying (including Water Curtain)
• Acid Treatment Without Chromium	• Painting-immersion (including Electrophoretic, "E-coat")
• Alcohol Cleaning	• Photo Imaging
• Alkaline Cleaning Neutralization	• Photo Image Developing
• Alkaline Treatment With Cyanide	• Photoresist Application
• Anodizing With Chromium	• Photoresist Strip
• Anodizing Without Chromium	• Phosphor Deposition
• Carbon Black Deposition	• Physical Vapor Deposition
• Catalyst Acid Pre-dip	• Plasma Arc Machining
• Chemical Conversion Coating Without Chromium	• Plastic Wire Extrusion
• Chemical Milling (or Chemical Machining)	• Salt Bath Descaling
• Chromate Conversion Coating (or Chromating)	• Shot Tower - Lead Shot Manufacturing
• Chromium Drag-out Destruction	• Soldering
• Cyanide Drag-out Destruction	• Solder Flux Cleaning
• Cyaniding Rinse	• Solder Fusing
• Electrochemical Machining	• Solder Masking
• Electroless Catalyst Solution	• Sputtering
• Electroless Plating	• Stripping (Paint)
• Electrolytic Cleaning	• Stripping (Metallic Coating)
• Electroplating With Chromium	• Thermal Infusion
• Electroplating With Cyanide	• Ultrasonic Machining
• Electroplating Without Chromium or Cyanide	• Vacuum Impregnation
• Electropolishing	• Vacuum Plating
• Galvanizing/Hot Dip Coating	• Water Shedder
• Hot Dip Coating	• Wet Air Pollution Control
• Kerfing	• Wire Galvanizing Flux
• Laminating	

Note: This list is replicated at 40 CFR 438.2(d) with definitions at Appendix C to Part 438.

Although many facilities performing proposed MP&M operations generate both metal- and oil-bearing wastewater, a large number of facilities, typically machine shops and maintenance and repair facilities, only generate process wastewater from oily operations (see Table 6-2). Because the wastewater at these facilities primarily contains oil and grease and other organic constituents, these facilities use treatment technologies that focus on oil removal only and do not include the chemical precipitation step needed to treat metal-bearing wastewater. These treatment technologies generally include oil skimming, chemical emulsion breaking followed by either gravity flotation, coalescing plate oil/water separators, dissolved air flotation (DAF), or ultrafiltration. Therefore, EPA first divided facilities on the basis of unit operations performed and the nature of the wastewater generated, resulting in the following two wastewater groups: (1) metal-bearing (with or without oily and organic constituents) group; and (2) oil-bearing only group. EPA then identified any significant differences in the subcategorization factors within the two basic groups.

Metal-Bearing Wastewater (With or Without Oil-Bearing Wastewater)

When evaluating facilities generating metal-bearing wastewater (with or without oil-bearing wastewater) for the final rule, EPA identified five groups of facilities that could potentially be subcategorized by dominant product, raw materials used, and/or nature of the waste generated: steel forming and finishing facilities, non-chromium anodizing facilities, metal finishing job shops, printed wiring board facilities, and general metals facilities. In two of these groups (non-chromium anodizing and metal finishing job shops), EPA also considered economic impacts as a subcategorization factor because of the reduced ability of these facilities to afford treatment costs. EPA describes its rationale for subcategorizing each of these groups below (see Section 6.2 for additional detailed discussion and applicability). In general, EPA identified four distinct groups within the metal-bearing group that warranted splitting out from the rest of this group.

Steel Forming and Finishing Facilities

EPA proposed moving certain finishing operations subject to the Iron and Steel Manufacturing effluent guidelines (40 CFR 420) into the scope of the MP&M regulations because EPA's analyses, at that time, showed these operations to be more similar to MP&M operations than to iron and steel operations (see W-00-25, Section 14.1, DCN IS10883). In the MP&M proposed rule, these operations (at stand-alone facilities and at steel manufacturing facilities) would have been subject to the limits and standards in the proposed Steel Forming and Finishing Subcategory. This subcategory would have applied to wastewater discharges from finishing or cold forming operations on steel wire, rod, bar, pipe, or tube. In order to better assess potential economic impacts associated with the final rule, EPA concluded that facilities performing these operations should be evaluated as a separate subcategory when EPA selected options for the final rule.

Commentors on the proposed rule stated that these operations and resulting wastewaters are comparable to those at facilities subject to the Iron and Steel Manufacturing

effluent guidelines and that these discharges should remain subject to Part 420 rather than the final MP&M rule. In addition, commentors stated that Part 420 adequately protects the environment from discharges associated with these activities.

For reasons discussed in Section 9.0, EPA is not revising limitations or standards for any facilities that would have been subject to this subcategory. Such facilities will continue to be regulated by the General Pretreatment Standards (Part 403), local limits, permit limits, and Iron and Steel effluent limitations guidelines (Part 420) as applicable.

Non-Chromium Anodizing Facilities

The non-chromium anodizers differ from other metal-bearing facilities performing proposed MP&M operations in that all of their products are primarily of one metal type, anodized aluminum, and, most importantly, they do not use chromic acid, dichromate sealants, or other process solutions containing significant concentrations of chromium in their anodizing process. Table 6-4 shows the percentage of facilities using multiple metal types by subcategory. EPA's data show that these facilities have very low levels of metals (with the exception of aluminum) and toxic organic pollutants in their wastewater discharges, while other facilities performing proposed MP&M operations have much greater concentrations of a wider variety of metals.

Table 6-4

Percentage of Facilities Performing Proposed MP&M Operations Using Multiple Metal Types by Subcategory

Subcategory	Percentage of Facilities by Number of Metal Types Processed					
	1	2	3	4	5-10	>10
General Metals	31	32	13	8	15	1
Metal Finishing Job Shops	6	18	17	13	38	7
Non-Chromium Anodizing	100	0	0	0	0	0
Oily Wastes	46	17	32	3	2	0
Printed Wiring Board	4	1	20	17	56	2
Railroad Line Maintenance	76	8	16	0	0	0
Shipbuilding Dry Dock	57	0	29	14	0	0
Steel Forming and Finishing	56	25	14	3	3	0

Source: MP&M Survey Database.

In addition, non-chromium anodizing facilities require more extensive wastewater treatment systems than other metal-bearing facilities performing proposed MP&M operations to remove both very high concentrations of aluminum (and resulting large volumes of wastewater treatment sludge) and relatively low levels of alloy metals generated in their wastewater. As a

result, these facilities have relatively higher treatment costs compared to other metal-bearing facilities. EPA also found that, due to their current economic state, non-chromium anodizing facilities are less able to afford pollutant control technologies as compared to other types of facilities (see the Economic, Environmental, and Benefits Analysis for the Final Metal Products & Machinery Rule (EEBA) (EPA-821-B-03-002)). Therefore, based on the differences in raw materials used, nature of the waste generated, treatment costs, and economic conditions, EPA concluded that non-chromium anodizing facilities should be evaluated as a separate subcategory when EPA selected options for the final rule.

For reasons discussed in Section 9.0, EPA is not revising limitations or standards for any facilities that would have been subject to this subcategory. Such facilities will continue to be regulated by the General Pretreatment Standards (Part 403), local limits, permit limits, and Parts 413 and/or 433, as applicable.

Metal Finishing Job Shops

EPA investigated whether to subcategorize the metal finishing and electroplating job shops covered currently by the Metal Finishing (40 CFR 433) and Electroplating (40 CFR 413) effluent guidelines (with the exception of printed circuit board manufacturers, which were analyzed as a separate subcategory as discussed below). Although these facilities have metal types that require the same treatment technologies as many other metal-bearing facilities, EPA determined that they can be different due to the variability of their raw materials and products as well as their current economic state compared to other metal-bearing facilities performing proposed MP&M operations. Metal finishing and electroplating job shops perform electroplating, electroless plating, anodizing, coating, and chemical etching and milling, and are “job shops” as defined in the Metal Finishing effluent guidelines (i.e., as owning less than 50 percent of the products processed on site).

Because metal finishing job shops work on a contract basis, they cannot always predict the type of plating or other finishing operations required. In addition, because these facilities work on a large variety of metal types from various customers, their wastewater characteristics can vary from week to week (or even day to day). Table 6-5 demonstrates the variety of metal types processed at metal finishing job shops as compared to the rest of the industry. EPA performed sampling to specifically identify the variability in the wastewater generated at metal finishing job shops, and found that the variability factors calculated solely on the analytical wastewater sampling data from metal finishing and electroplating job shops are higher for most pollutant parameters than those calculated for other metal-bearing subcategories (see Section 10.1 for a discussion of EPA’s variability factor calculations). In addition, EPA found that, due to the current economic state, metal finishing job shops are less able to afford pollutant control technologies compared to other metal-bearing subcategories (see the EEBA). For these reasons, EPA concluded that metal finishing and electroplating job shops should be evaluated as a separate subcategory when EPA selected options for the final rule.

Table 6-5

**Percentage of Facilities Performing Proposed MP&M Operations by
Subcategory Using Each Metal Type**

Metal	Percentage of Facilities by Subcategory							
	General Metals	Metal Finishing Job Shops	Non-Chromium Anodizing	Oily Wastes	Printed Wiring Board	Railroad Line Maintenance	Shipbuilding Dry Dock	Steel Forming and Finishing
Aluminum	69	154	88	67	17	32	14	3
Beryllium	< 1	0	0	0	0	0	0	0
Cadmium	2	12	0	0	0	0	0	3
Chromium	9	21	0	< 1	4	0	0	10
Cobalt	4	0	0	1	2	0	0	3
Copper	29	50	0	20	99	8	43	10
Gold	4	13	0	< 1	73	0	0	0
Indium	< 1	0	0	< 1	0	0	0	0
Iron	82	94	12	96	5	100	100	100
Lead	6	4	0	1	72	0	0	1
Magnesium	3	6	0	1	0	0	0	0
Manganese	< 1	0	0	< 1	1	0	0	0
Molybdenum	1	0	0	0	5	0	0	0
Nickel	17	54	0	5	79	0	43	5
Palladium	1	0	0	1	5	0	0	0
Platinum	1	1	0	0	0	0	0	0
Rhodium	1	7	0	0	3	0	0	0
Selenium	< 1	0	0	0	0	0	0	0
Silver	3	17	0	< 1	10	0	0	0
Tantalum	1	0	0	< 1	0	0	0	0
Tin	15	29	0	2	89	0	0	5
Titanium	3	3	0	2	0	0	0	3
Tungsten	1	0	0	< 1	0	0	0	0
Vanadium	0	0	0	< 1	0	0	0	0
Zinc	18	59	0	3	4	0	0	29
Zirconium	< 1	0	0	< 1	0	0	0	0

Source: MP&M Survey Database.

For reasons discussed in Section 9.0, EPA is not revising any limitations or standards for facilities that would have been subject to this subcategory. Such facilities will continue to be regulated by the General Pretreatment Standards (Part 403), local limits, permit limits, and Parts 413 and/or 433, as applicable.

Printed Wiring Board Facilities

EPA subcategorized printed wiring board facilities based on raw materials, unit operations performed, primary product, and nature of the waste generated. First, as shown in Table 6-5, printed wiring board facilities process a more consistent set of metal types (copper, tin, lead, nickel, and gold) than other metal-bearing facilities. EPA concluded that this consistent mix of metal types enables printed wiring board facilities to tailor their treatment technology. Printed wiring board facilities generally work with copper-clad laminate material, allowing them to target copper for removal in their wastewater treatment systems or recover the copper using in-process ion exchange.

Second, printed wiring board facilities apply, develop, and strip photoresist - a set of unit operations that is unique to this subcategory. This process produces a higher concentration of a more consistent group of organic constituents than other facilities in the metal-bearing group. Printed wiring board facilities also require chelation breaking more often than other facilities performing proposed MP&M operations. Finally, the nature of the wastewater generated at these facilities may also be different because these facilities perform more lead-bearing operations (e.g., lead/tin electroplating, wave soldering) than other facilities performing proposed MP&M operations. For these reasons, EPA concluded that printed wiring board facilities should be evaluated as a separate subcategory when EPA selected options for the final rule.

At proposal, EPA included printed wiring board job shops in the Metal Finishing Job Shops Subcategory based on the similar economic considerations for job shops. However, information submitted by commentors in response to the proposed rule indicates that printed wiring board job shops are much more similar to Printed Wiring Board Subcategory facilities than to metal finishing job shops when considering their wastewater characteristics and operations. Therefore, for the final rule, EPA included printed wiring board job shops in the Printed Wiring Board Subcategory evaluated for the final rule.

For reasons discussed in Section 9.0, EPA is not revising any limitations or standards for facilities that would have been subject to this subcategory. Such facilities will continue to be regulated by the General Pretreatment Standards (Part 403), local limits, permit limits, and Parts 413 and/or 433, as applicable.

General Metals Facilities

After developing separate subcategories for non-chromium anodizing facilities, metal finishing job shops, printed wiring board facilities, and steel forming and finishing

facilities, EPA grouped the remaining metal-bearing wastewater generating facilities performing proposed MP&M operations into a subcategory entitled “General Metals” for evaluating options for the final rule. This subcategory would be a “catch-all” for metal-bearing wastewater-generating facilities that do not fall into any of the previous subcategories. For example, wastewater generated from most manufacturing operations and heavy rebuilding operations (e.g., aircraft, aerospace, auto, bus/truck, railroad) would be grouped under the General Metals Subcategory.

Based on comments received on the proposed rule, EPA reviewed the unit operations of printed wiring assembly facilities and determined that they are most similar to the facilities in the General Metals Subcategory (discussed below). Printed wiring assembly facilities do not manufacture printed circuit boards, but instead attach circuit boards to other structures. Therefore, they do not perform the operations typical of a printed wiring board facility (e.g., applying photoresist, etching the board, or stripping). At proposal, EPA included most printed wiring assembly facilities in the General Metals Subcategory; however, some were included in the Printed Wiring Board Subcategory. For the final rule, EPA included all printed wiring assembly facilities in the General Metals Subcategory.

As discussed in the NODA (67 FR 38767), EPA considered establishing a segment of the Steel Forming and Finishing Subcategory for discharges resulting from continuous electroplating of flat steel products (e.g., strip, sheet, and plate). EPA reexamined its database for facilities that perform continuous steel electroplating, and found that, contrary to its initial finding, continuous electroplaters do not perform operations similar to other facilities in this subcategory (i.e., steel forming and finishing facilities performing cold forming on steel wire, rod, bar, pipe, and tube) (see Section 24.6.1 of the rulemaking record, DCN 17919). Thus, EPA included continuous electroplaters performing electroplating and coating operations in the General Metals Subcategory for evaluating options for the final rule.

As also discussed in the NODA, EPA also considered an additional subcategory for facilities that primarily perform zinc electroplating (“zinc platers”). EPA uses the term “zinc platers” to describe facilities where over 95 percent of their wastewater is generated from zinc electroplating lines. Most of these facilities follow electroplating with chromium conversion coating. Depending on whether or not these facilities operate as a captive or a job shop, EPA had proposed to include them as part of the General Metals or Metal Finishing Job Shops Subcategories, respectively. The wastewater characteristics of zinc platers differ from other facilities in these two subcategories, particularly with respect to their concentrations of zinc. Where nonzinc platers may have concentrations of 10 to 90 mg/l zinc in their wastewater prior to treatment, zinc platers have concentrations of 100 to 800 mg/l zinc in their wastewater prior to treatment. However, zinc platers have very low concentrations of other pollutants as compared to nonzinc platers.

The NODA explained that EPA was also considering: (1) creating a separate subcategory for zinc platers; (2) segmenting zinc platers within the General Metals and Metal Finishing Job Shops Subcategories; or (3) retaining the proposed subcategory structure and

establishing numerical limitations and standards for zinc that would be achievable by zinc platers. NODA commentors supported retaining the proposed subcategories as long as zinc platers could achieve the zinc numerical limitations and standards. Commentors raised concerns that creating a separate subcategory or segment to address the limitations for one pollutant would be confusing and difficult to implement. EPA did not create a separate subcategory or segment for zinc platers in evaluating the data for the final rule. EPA included zinc platers in the General Metals or Metal Finishing Job Shops Subcategories, as applicable, for evaluating options for the final rule.

For reasons discussed in Section 9.0, EPA is not revising or establishing any limitations or standards for facilities that would have been subject to this subcategory. Such facilities will continue to be regulated by the General Pretreatment Standards (Part 403), local limits, permit limits, and Parts 413 and/or 433, as applicable.

In summary, EPA divided facilities that generate metal-bearing wastewater, with or without oil-bearing wastewater, into the following five subcategories: (1) non-chromium anodizing facilities; (2) metal finishing job shops; (3) printed wiring board facilities; (4) steel forming and finishing; and (5) general metals facilities.

Oil-Bearing Wastewater Only Group

When evaluating facilities generating oil-bearing wastewater for the final rule, EPA identified three groups of facilities that could potentially be subcategorized by size, location, and dominant product or activity: railroad line maintenance facilities, shipbuilding dry docks or similar structures, and oily wastes facilities (see Section 6.2 for detailed descriptions of these subcategories).

Railroad line maintenance facilities perform routine cleaning and light maintenance on railroad engines, cars, car-wheel trucks, or similar parts or machines, and discharge wastewater exclusively from oily operations (see Section 1.0). EPA subcategorized railroad line maintenance facilities due to their outdoor location, unit operations performed, and low level of pollutant loadings they discharge to the environment. EPA also determined that the railroad line maintenance facilities discharge a much more limited range of organic pollutants than general oily-wastewater-bearing facilities. These facilities perform only one or more of the following operations: assembly/disassembly, floor cleaning, maintenance machining (wheel truing), touch-up painting, and washing. In addition, because some of these operations are typically performed outdoors, stormwater collection and treatment is of concern for this subcategory. Therefore, EPA included railroad line maintenance facilities in the Railroad Line Maintenance Subcategory evaluated for the final rule. EPA notes that this subcategory does not include railroad manufacturing facilities or railroad overhaul or heavy maintenance facilities.

The second type of facility is dry docks (and similar structures such as graving docks, building ways, lift barges, and marine railways). These are large, outdoor areas, exposed to precipitation, where shipyards perform final assembly, maintenance, rebuilding, and repair

work on large ships and boats. In evaluating options for the final rule, EPA grouped shipbuilding dry docks and similar structures in the Shipbuilding Dry Dock Subcategory due to their size, outdoor location, low level of pollutant loadings they discharge to the environment, and the fact this wastewater is unique to the shipbuilding industry. This subcategory does not include other proposed MP&M operations that occur at shipyards (e.g., shore-side operations such as electroplating).

The facilities that generate only oil-bearing wastewater but are not dry docks or railroad line maintenance facilities fall into the Oily Wastes Subcategory (40 CFR 438, Subpart A). These facilities meet the applicability criteria in Section 438.1 and discharge only oil-bearing wastewater and perform one or more oily operations listed in Table 6-2.

EPA received comments at proposal concerning the definition of “oily operations” used in the applicability statement of the Oily Wastes Subcategory (see Section 6.2.5). Commentors provided data on several proposed MP&M operations that were not considered “oily operations” in the proposed rule. These operations include:

- Abrasive blasting;
- Adhesive bonding;
- Alkaline treatment without cyanide;
- Assembly/disassembly;
- Burnishing;
- Calibration;
- Electrical discharge machining;
- Iron phosphate conversion coating;
- Painting-spray or brush (including water curtains);
- Polishing;
- Thermal cutting;
- Tumbling/barrel finishing/mass finishing/vibratory finishing;
- Washing (finished products);
- Welding; and
- Wet air pollution control for organic constituents.

The data show low levels of metals in these unit operations. Based on the data received and a review of other unit operations containing only low metals content, EPA revised the definition of “oily operations” in the Oily Wastes Subcategory (see 40 CFR 438.2(f)) to incorporate these additional unit operations considered in the NODA, with the exception of bilge water. Bilge water from ships that are afloat is not considered an in-scope wastewater for any subcategories of the MP&M rule and was inadvertently included in the oily operations definition in the NODA. Bilge water from ships in a dry dock or similar structure is considered for the Shipbuilding Dry Dock Subcategory only.

In addition, EPA is no longer including wastewater from laundering as part of the oily operations definition because EPA does not consider it to be a process wastewater under this rule (67 FR 38766).

For reasons discussed in Section 9.0, EPA is only promulgating limitations and standards for existing and new direct dischargers in the Oily Wastes Subcategory. EPA is not promulgating pretreatment standards for existing or new indirect dischargers in this subcategory.

In summary, EPA divided facilities that generate only oil-bearing wastewater into the following three subcategories: (1) railroad line maintenance facilities; (2) shipbuilding dry docks (and similar structures); and (3) oily wastes facilities.

For reasons discussed in Section 9.0, EPA is not establishing limitations or standards for any facilities in two subcategories evaluated for the final rule that only discharge oil-bearing wastewater: Railroad Line Maintenance Subcategory and Shipbuilding Dry Dock Subcategory. Permit writers and control authorities will establish controls using best professional judgment (BPJ) to regulate wastewater discharges from these facilities.

6.1.2 Factors That are Not a Basis For MP&M Subcategorization

During its consideration of the final rule, EPA examined the other factors listed earlier in this section for possible basis of subcategorization. The Agency determined that there was no basis for subcategorizing facilities performing proposed MP&M operations based on the following factors: geographic location, age of facilities, total energy requirements, air pollution control methods, and solid waste generation and disposal. These factors are discussed below. In addition, EPA also considered subcategorizing the facilities performing proposed MP&M operations according to the 18 industrial sectors proposed in the January 2001 proposal (66 FR 424). As described in Section 1.0, EPA did not regulate the following industrial sectors (Job Shops, Printed Wiring Board Manufacturing, and Steel Forming & Finishing) as part of the final rule. As discussed in Section 6.1.1, and further discussed below, EPA determined for evaluating options for the final rule that subcategorization based on sectors was appropriate for only one sector (printed wiring boards), and for portions of three other sectors (railroad, ships and boats, and job shops).

For the Steel Forming and Finishing Subcategory, EPA did not have sector information from the Iron and Steel Surveys; therefore, EPA evaluated the steel forming and finishing sites as their own subcategory for the proposed and final rule. EPA concluded that the basis for subcategorization is the difference in the raw material and primary product at these facilities. Facilities in this proposed subcategory primarily process steel and, for the most part, produce uniformly shaped products such as wire, rod, bar, pipe, and tube. In addition, this is the only subcategory for which EPA proposed to cover forming operations under the MP&M regulations.

Geographic Location

Facilities performing proposed MP&M operations are located throughout the United States. Sites are not limited to any one geographical location, but approximately half are located east of the Mississippi River, with additional concentrations of facilities in Texas, Colorado, and California. EPA did not subcategorize based on geographic location because location does not affect the ability of facilities to comply with the MP&M final rule. EPA's data show that well-performing facilities are located throughout the United States.

Geographic location may impact costs if additional land is required to install treatment systems, because the cost of the land will vary depending on whether the site is located in an urban or rural location. However, the treatment systems used to treat wastewater typically do not have large land requirements, as demonstrated by the fact that many facilities performing proposed MP&M operations are located in urban settings. The Agency, however, recognizes that spatial constraints may present a problem for certain facilities and believes this issue should be evaluated on a case-by-case basis.

Water availability is another function of geographical location. Limited water supply encourages efficient use of water. The Agency encourages installing water recycle and reuse practices. Some technology options evaluated for the final rule include pollution prevention and water conservation because these practices tend to reduce treatment costs and improve pollutant removals.

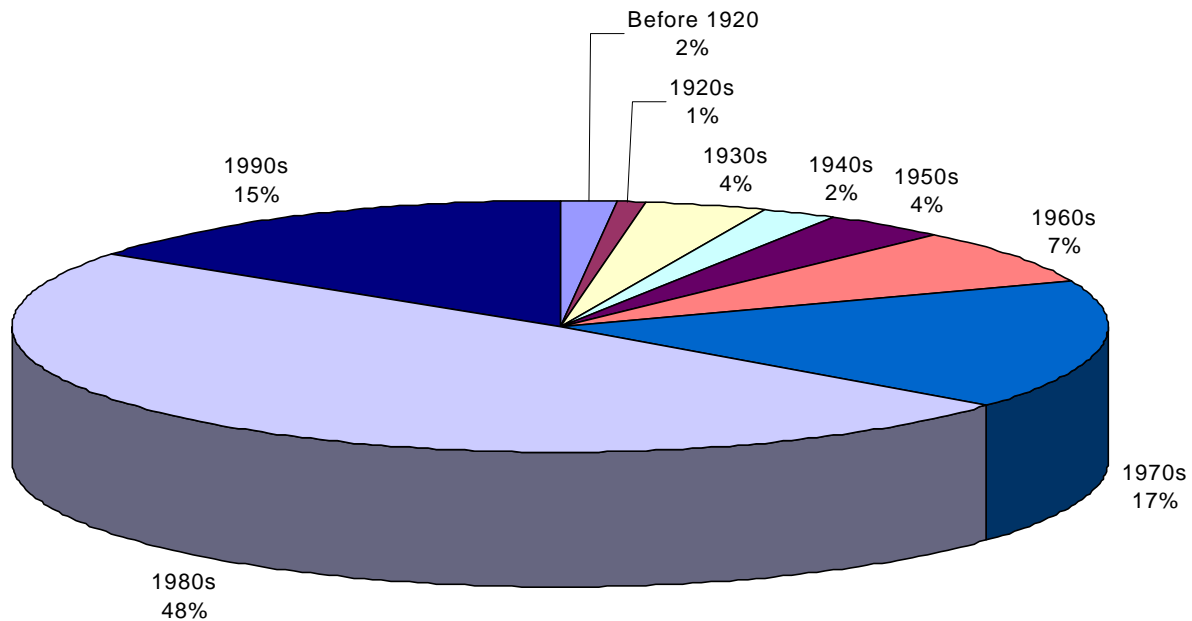
Facility Age

Figure 6-1 presents the percentage of water-discharging facilities by the decade in which they were built. This information is based upon responses to MP&M surveys that reported the date the facility was built.

Most facilities have been built since 1970. Although the survey respondents reported a wide range of ages, these facilities must be continually modernized to remain competitive. Most of the facilities EPA visited during the MP&M site visit program had recently modernized some area of their site. Modernizing production processes and air pollution control equipment results in generation of similar process waste types regardless of the site's age. Therefore, EPA did not select facility age as a basis for subcategorization. EPA's data show that well-performing facilities include both older and newer facilities.

Total Energy Requirements

EPA did not select total energy requirements as a basis for subcategorization because the estimated increase in energy consumption for the final rule is trivial (< 0.001 percent) as compared to national energy usage (see Section 13.0). EPA estimated the energy requirements associated with each MP&M technology option and considered these in estimating compliance costs (see Section 11.0).



Source: MP&M Survey Database.

Note: Although there are 44,000 wastewater-discharging facilities performing proposed MP&M operations, only 42,282 are represented in the above pie chart. Several 1989 and 1996 Long Survey and several Municipality Survey recipients did not provide this information.

Figure 6-1. Percentage of Wastewater-Discharging Facilities Evaluated for the Final Rule by Decade Built

Air Pollution Control Methods

Many facilities control air emissions using wet air pollution control units that affect the wastewater flow rate from the site. However, based on data collected during the MP&M sampling program, wastewater generated by these devices does not affect the effectiveness of technologies used to control wastewater pollutant loadings from proposed

MP&M operations (see Sections 5.2 and 15.3 of the rulemaking record). EPA considers some wet air pollution control units as proposed MP&M operations, but not as a basis of subcategorizing the category.

Industrial Sectors

EPA considered subcategorizing facilities performing proposed MP&M operations by industrial sector (e.g., aerospace, aircraft, bus and truck, electronic equipment, hardware, household equipment, instruments, job shops, mobile industrial equipment, motor vehicles, office machines, ordnance, precious metals and jewelry, printed wiring boards, railroad, ships and boats, stationary industrial equipment, steel forming and finishing, and miscellaneous metal products). The Agency determined that subcategorization based solely on industrial sector would be complex and confusing because many facilities are in multiple sectors. Adopting such a subcategorization scheme would complicate the implementation of the limitations and standards because permit writers might be required to develop facility-specific limitations across multiple subcategories.

The Agency determined that wastewater characteristics, unit operations, and raw materials used to produce products within a given sector are not always the same from site to site, and they are not always different from sector to sector. Within each sector, facilities can perform a variety of unit operations on a variety of raw materials. For example, a site in the aerospace sector may primarily machine aluminum missile components and not perform any surface treatment other than alkaline cleaning. Another site in that sector may electroplate iron parts for missiles and perform little or no machining. Wastewater characteristics from these facilities may differ because of the different unit operations performed and different raw materials used. As another example, an automobile manufacturer and an automobile repair facility are both part of the motor vehicle sector. However, the automobile manufacturer may perform unit operations that generate metal-bearing and oil-bearing wastewater (aqueous degreasing, electroplating, chemical conversion coating, etc.) while the automobile repair facility may perform unit operations that generate only oil-bearing wastewater (machining, aqueous degreasing, impact deformation, painting, etc.).

Based on the analytical data collected for this rule, EPA has not found a statistically significant difference in industrial wastewater discharge among industrial sectors when performing similar unit operations for cadmium, chromium, copper, cyanide, lead, manganese, molybdenum, nickel, oil and grease, silver, tin, total suspended solids (TSS), and zinc. (The analytical data are available in Sections 5 and 15 of the rulemaking record.) In other words, after dividing facilities performing proposed MP&M operations according to the unit operations performed (metal-bearing or oil-bearing operations), EPA concluded that raw wastewater has similar treatability across all of the industrial sectors. For example, a facility that performs chromium electroplating in the process of manufacturing office machines produces metal-bearing wastewater with similar chemical characteristics as a facility that performs chromium electroplating in the process of manufacturing a part for a bus. Similarly, a facility that performs machining to repair and maintain an airplane engine produces oil-bearing

wastewater that has similar chemical characteristics to a facility that performs machining to repair and maintain construction machinery.

Most proposed MP&M operations are not unique to a particular sector and are performed across all sectors. For example, all sectors perform several of the major wastewater-generating unit operations (e.g., alkaline treatment, acid treatment, machining, electroplating). And, for the most part, the unit operations that are rarely performed (e.g., abrasive jet machining) are not performed in all sectors, but are also not limited to a single sector. Therefore, a facility in any one of the proposed industrial sectors can generate metal-bearing or oil-bearing wastewater (or a combination of both) depending on what unit operations the facility performs.

Due to the reasons stated above, EPA determined that a regulation based on industrial sector would create a variety of implementation issues for state and local regulators as well as for those multiple-sector facilities. As a result, EPA did not use industrial sector as a basis for subcategorizing the industry.

Solid Waste Generation and Disposal

Physical and chemical characteristics of solid waste generated by facilities performing proposed MP&M operations are determined by the raw materials, unit operations, and types of air pollution control in use. Therefore, this factor does not provide a primary basis for subcategorization. The subcategorization scheme that EPA is promulgating should account for any variations in solid waste generation and disposal. EPA considered the amount of sludge generated as a result of the MP&M technology options, and included disposal of these sludges in the compliance cost estimates (see Section 11.0) and non-water quality impact assessments (see Section 13.0).

6.2 General Description of Facilities in Each Subcategory Evaluated for the Final Rule

Below is a general description of the types of facilities that fall within each of the subcategories evaluated for the final rule. Sections 11.0 and 12.0 present information on compliance costs and pollutant reductions, respectively, evaluated for the final rule for each proposed subcategory. However, for reasons discussed in Section 9.0 and Section VI of the preamble to the final rule, the final rule establishes effluent limitations guidelines and standards for new and existing direct dischargers in one subcategory: Oily Wastes (40 CFR 438, Subpart A).

6.2.1 General Metals Subcategory Evaluated for the Final Rule

As discussed in Section 6.1, the General Metals Subcategory evaluated for the final rule is a “catch-all” for facilities performing proposed MP&M operations that discharge metal-bearing wastewater (with or without oil-bearing wastewater) that do not fit the applicability of the Metal Finishing Job Shops, Non-Chromium Anodizing, and Printed Wiring

Board Subcategories evaluated for the final rule. This proposed subcategory also includes general metals facilities that are owned and operated by the federal government, states and municipalities. General metals facilities typically perform manufacturing or heavy rebuilding of metal products, parts, or machines. Facilities that perform metal finishing or electroplating operations on site, but do not meet the definition of a job shop (i.e., captive shops), would fit in the proposed General Metals Subcategory. EPA also includes continuous electroplaters of flat steel products (e.g., strip, sheet, and plate) in the General Metals Subcategory evaluated for the final rule.

Wastewater discharges from railroad overhaul or heavy maintenance facilities may be covered by the MP&M effluent guidelines (Subpart A), the Metal Finishing Point Source Category (40 CFR 433), or by other effluent limitations guidelines, as applicable. This provision is codified at 40 CFR 438.1(d). Facilities engaged in the manufacture, overhaul or heavy maintenance of railroad engines, cars, car-wheel trucks, or similar parts or machines (“railroad overhaul or heavy maintenance facilities”) typically perform different unit operations than railroad line maintenance facilities. Railroad line maintenance facilities perform routine cleaning and light maintenance on railroad engines, cars, car-wheel trucks, or similar parts or machines, and discharge wastewater exclusively from oily operations. These facilities only perform one or more of the following operations: assembly/disassembly, floor cleaning, maintenance machining (wheel truing), touch-up painting, and washing.

Railroad overhaul or heavy maintenance facilities are engaged in the manufacture, overhaul, or heavy maintenance of railroad engines, cars, car-wheel trucks, or similar parts or machines. These facilities typically perform one or more of the same operations as railroad line maintenance facilities and one or more of the following operations: abrasive blasting, alkaline cleaning, aqueous degreasing, corrosion preventive coating, electrical discharge machining, grinding, heat treating, impact deformation, painting, plasma arc machining, polishing, pressure deformation, soldering/brazing, stripping (paint), testing, thermal cutting, and welding. Depending on the operations performed, railroad overhaul or heavy maintenance facilities may be included in the proposed General Metals Subcategory or the Oily Wastes Subcategory.

EPA estimates that there are approximately 10,914 indirect dischargers and 250 direct dischargers in the General Metals Subcategory evaluated for the final rule. EPA currently regulates 99 percent of the facilities in this proposed subcategory by existing effluent guidelines. Some general metals facilities are currently covered by multiple regulations. The Agency estimates that, based on responses to its questionnaires, the Metal Finishing (40 CFR 433) and Electroplating (40 CFR 413) effluent guidelines cover approximately 89 percent and 16 percent, respectively, of general metals facilities. Approximately 50 percent of the general metals facilities are covered by other metal-related effluent guidelines (see Section 1.2.7). Facilities in the proposed General Metals Subcategory are specifically not regulated by the final rule (see 40 CFR 438.1(b)).

6.2.2 Metal Finishing Job Shops Subcategory Evaluated for the Final Rule

Facilities in the Metal Finishing Job Shops Subcategory evaluated for the final rule met the following criteria: (1) perform one or more of the following five operations: electroplating, electroless plating, anodizing, chemical conversion coating (chromating, phosphating, passivation, and coloring), and chemical etching and milling, and (2) own not more than 50 percent (on an annual area basis) of the materials undergoing metal finishing. (Note that printed wiring board job shops are in the Printed Wiring Board Subcategory evaluated for the final rule based on the operations performed and wastewater characteristics.)

The Agency estimates that there are approximately 1,530 indirect dischargers and 12 direct dischargers in the Metal Finishing Job Shops Subcategory evaluated for the final rule. EPA currently regulates all facilities in this proposed subcategory under the existing Metal Finishing or Electroplating effluent guidelines and standards.

EPA has identified approximately 32,139 facilities that meet the definition of job shop but do not perform one or more of the five metal finishing operations listed above. EPA does not consider such job shops to be part of the Metal Finishing Job Shops Subcategory. These other job shops typically perform assembly, painting, and machining on a contract basis and are included in the General Metals, Oily Wastes, or Printed Wiring Board Subcategories evaluated for the final rule. Facilities in the Metal Finishing Job Shops proposed subcategory are specifically not regulated by the final rule (see 40 CFR 438.1(b)).

6.2.3 Non-Chromium Anodizing Subcategory Evaluated for the Final Rule

Facilities in the Non-Chromium Anodizing Subcategory evaluated for the final rule performed aluminum anodizing without using chromic acid or dichromate sealants. Anodizing is a surface conversion operation used to alter the properties of aluminum for better corrosion resistance and heat transfer. Generally, non-chromium anodizing facilities perform sulfuric acid anodizing; however, facilities can use other acids (except chromic acid), such as oxalic acid, for aluminum anodizing. In evaluating options for the final rule, EPA included anodizers that use chromic acid or dichromate in the proposed General Metals Subcategory or, if they operate as a job shop, in the proposed Metal Finishing Job Shops Subcategory.

Some facilities that could potentially fall into the proposed Non-Chromium Anodizing Subcategory also may perform other metal surface finishing operations. If these facilities commingle wastewater from their non-chromium anodizing operations with wastewater from other surface finishing operations (e.g., chromic acid anodizing, electroplating, chemical conversion coating) for treatment, or perform chromium-bearing operations on site, they would not be included in the proposed Non-Chromium Anodizing Subcategory. Instead, the proposed General Metals or Metal Finishing Job Shops Subcategories would apply.

EPA estimates that there are approximately 122 indirect dischargers in the proposed Non-Chromium Anodizing Subcategory. EPA did not identify any direct discharging

non-chromium anodizers in its survey efforts. The wastewater generated at non-chromium anodizing facilities contains relatively low levels of metals, with the exception of aluminum, and low levels of toxic organic pollutants. Facilities in the proposed Non-Chromium Anodizing Subcategory are specifically not regulated by the final rule (see 40 CFR 438.1(b)).

6.2.4 Printed Wiring Board Subcategory Evaluated for the Final Rule

The Printed Wiring Board Subcategory evaluated for the final rule includes wastewater discharges from the manufacture and repair of printed wiring boards (i.e., circuit boards), including job shops. However, printed wiring assembly facilities are included in the General Metals Subcategory evaluated for the final rule. EPA currently regulates all facilities in this proposed subcategory by the existing Metal Finishing or Electroplating effluent limitation guidelines and standards. EPA estimates that there are approximately 840 indirect dischargers and 8 direct dischargers in the Printed Wiring Board Subcategory evaluated for the final rule. Facilities in the Printed Wiring Board Subcategory evaluated for the final rule are specifically not regulated by the final rule (see 40 CFR 438.1(b)).

6.2.5 Steel Forming and Finishing Subcategory Evaluated for the Final Rule

Facilities in the Steel Forming and Finishing Subcategory evaluated for the final rule performed MP&M finishing operations and/or cold forming operations on steel wire, rod, bar, pipe, or tube. This subcategory does not include facilities that perform those operations on other base materials. Generally, steel forming and finishing facilities perform acid pickling, annealing, conversion coating (e.g., zinc phosphate, copper sulfate), hot dip coating and/or electroplating of steel wire or rod, heat treatment, welding, drawing, patenting, and oil tempering.

EPA estimates that there are approximately 110 indirect and 43 direct dischargers in the proposed Steel Forming and Finishing Subcategory. EPA currently regulates all facilities in this proposed subcategory under the Iron and Steel Point Source Category (40 CFR 420). Facilities in the proposed Steel Forming and Finishing Subcategory are specifically not regulated by the final rule (see 40 CFR 438.1(b)).

6.2.6 Oily Wastes Subcategory

The Oily Wastes Subcategory established in the final rule is a “catch-all” for facilities in one or more of the 16 industrial sectors (see Section 1.0) performing proposed “oily operations” (see Table 6-2) and are not specifically excluded by the applicability to the final rule (see Section 1.0 and 40 CFR 438.1). EPA defined the applicability of this subcategory by the presence of specific unit operations (see Table 6-2). Facilities in the proposed Railroad Line Maintenance or Shipbuilding Dry Dock Subcategories (see below) are not subject to the Oily Wastes Subcategory in the final rule (see Section 1.0 and 40 CFR 438.1(d) and 438.1(e)(5)). Facilities in the Oily Wastes Subcategory are predominantly machine shops or maintenance and repair shops. This subcategory also includes federal, municipal, and state-owned facilities performing only the listed operations.

In the final rule, EPA also clarified the applicability of certain unit operations. EPA defined “corrosion preventive coating” in the final rule (40 CFR 438.2(c)) as “the application of removable oily or organic solutions to protect metal surfaces against corrosive environments. Corrosion preventive coatings include, but are not limited to: petrolatum compounds, oils, hard dry-film compounds, solvent-cutback petroleum-based compounds, emulsions, water-displacing polar compounds, and fingerprint removers and neutralizers. Corrosion preventive coating does not include electroplating, or chemical conversion coating operations.” EPA’s analytical database shows that wastewater generated from phosphate conversion coating operations may contain high levels of zinc, nickel, and manganese (see Section 16.5.1 of the rulemaking record, DCN 16715).

However, based on comments on the January 2001 proposal and June 2002 NODA, EPA added iron phosphate conversion coating to the final list of oily operations (see 40 CFR 438.2(f) and Appendix B to Part 438). EPA defined iron phosphate conversion coating as “the process of applying a protective coating on the surface of a metal using a bath consisting of a phosphoric acid solution containing no metals (e.g., manganese, nickel, or zinc) or a phosphate salt solution (i.e., sodium or potassium salts of phosphoric acid solutions) containing no metals (e.g., manganese, nickel, or zinc) other than sodium or potassium. Any metal concentrations in the bath are from the substrate.” EPA notes that iron phosphate conversion coating should be distinguished from zinc, manganese, or nickel phosphate conversion coating based on the constituents of the bath. Manganese, nickel, or zinc phosphate conversion coating baths contain metals in addition to what may be added from the substrate.

If a facility discharges wastewater from any of the operations listed in Table 6-2, but also discharges wastewater from any of the operations listed in Table 6-3, it does not meet the criteria of the Oily Wastes Subcategory but instead would have been included under either the proposed General Metals Subcategory or another metal-bearing wastewater proposed subcategory. EPA determined that both of the following wastewaters require some form of wastewater treatment (e.g., chemical precipitation) to properly remove metals: (1) wastewaters from metal-bearing operations; and (2) wastewaters commingled from metal-bearing operations and oily operations. Thus, the final regulations do not apply to the discharge of wastewater from oily operations commingled with wastewater from metal-bearing operations. Additionally, the regulations in the final rule do not apply to process wastewater discharges subject to the limitations and standards of other effluent limitations guidelines (e.g., Metal Finishing (40 CFR 433) or Iron and Steel Manufacturing (40 CFR 420)). These provisions are codified in the final rule at 40 CFR 438.1(b):

“The regulations in this part do not apply to process wastewaters from metal-bearing operations (as defined at §438.2(d) and Appendix C of this part) or process wastewaters which are subject to the limitations and standards of other effluent limitations guidelines (e.g., Metal Finishing (40 CFR 433) or Iron and Steel Manufacturing (40 CFR 420)). The regulations in this part also do not apply to process wastewaters from oily operations (as defined at §438.2(f) and Appendix B of this part) commingled with process wastewaters already covered

by other effluent limitations guidelines or with process wastewaters from metal-bearing operations. This provision must be examined for each point source discharge at a given facility.”

Wastewater discharges from railroad overhaul or heavy maintenance facilities may be covered by the MP&M effluent guidelines (Subpart A), the Metal Finishing Point Source Category (40 CFR 433), or by other effluent limitations guidelines, as applicable. This provision is codified at 40 CFR 438.1(d). Facilities engaged in the manufacture, overhaul or heavy maintenance of railroad engines, cars, car-wheel trucks, or similar parts or machines (“railroad overhaul or heavy maintenance facilities”) typically perform different unit operations than railroad line maintenance facilities. Railroad line maintenance facilities perform routine cleaning and light maintenance on railroad engines, cars, car-wheel trucks, or similar parts or machines, and discharge wastewater exclusively from oily operations. These facilities only perform one or more of the following operations: assembly/disassembly, floor cleaning, maintenance machining (wheel truing), touch-up painting, and washing.

Railroad overhaul or heavy maintenance facilities are engaged in the manufacture, overhaul, or heavy maintenance of railroad engines, cars, car-wheel trucks, or similar parts or machines. These facilities typically perform one or more of the same operations as railroad line maintenance facilities and one or more of the following operations: abrasive blasting, alkaline cleaning, aqueous degreasing, corrosion preventive coating, electrical discharge machining, grinding, heat treating, impact deformation, painting, plasma arc machining, polishing, pressure deformation, soldering/brazing, stripping (paint), testing, thermal cutting, and welding. Depending on the operations performed, railroad overhaul or heavy maintenance facilities may be included in the proposed General Metals Subcategory or the Oily Wastes Subcategory.

EPA estimates that there are approximately 26,824 indirect dischargers and 2,382 direct dischargers in the Oily Wastes Subcategory. EPA has concluded that less than two percent of the MP&M process wastewater discharged from the facilities in this subcategory is covered by existing effluent guidelines. Limitations and standards for this subcategory are given in Section 1.0 and at 40 CFR 438, Subpart A (Oily Wastes).

6.2.7 Railroad Line Maintenance Subcategory Evaluated for the Final Rule

The Railroad Line Maintenance Subcategory evaluated for the final rule included facilities that perform routine cleaning and light maintenance (mostly consisting of parts replacement) on railroad engines, cars, car-wheel trucks, and similar parts or machines. These facilities discharge wastewater from only those proposed MP&M operations that EPA defines as oily operations (see Table 6-2). The wastewater generated at railroad line maintenance facilities contains relatively low levels of metals and toxic organic pollutants. Because these operations are conducted outdoors, these facilities may also discharge large volumes of stormwater that may or may not be commingled with process wastewater.

Railroad line maintenance facilities are similar to facilities in the Oily Wastes Subcategory in that they produce oil-bearing wastewater and do not perform MP&M operations that generate wastewater that requires metals removal treatment technology. This proposed subcategory does not include railroad manufacturing facilities or railroad overhaul or heavy maintenance facilities. Railroad manufacturing facilities and railroad overhaul or heavy maintenance facilities perform operations more similar to operations in the proposed General Metals Subcategory (e.g., acid treatment without chromium) and Oily Wastes Subcategory (e.g., heat treating and impact deformation).

EPA estimates that there are approximately 820 indirect dischargers and 9 direct dischargers in the proposed Railroad Line Maintenance Subcategory evaluated for the final rule. Facilities in the proposed Railroad Line Maintenance Subcategory are specifically not regulated by the final rule (see Section 1.0 and 40 CFR 438.1(d)). Additionally, EPA did not establish and limitations and standards for the proposed General Metals Subcategory (see Section 9.0). Consequently, railroad manufacturing facilities and railroad overhaul or heavy maintenance facilities in the proposed General Metals Subcategory will continue to be regulated by the General Pretreatment Standards (Part 403), local limits, permit limits, and Parts 413 and/or 433, as applicable.

6.2.8 Shipbuilding Dry Dock Subcategory

The Shipbuilding Dry Dock Subcategory evaluated for the final rule included wastewater generated in or on dry docks and similar structures such as graving docks, building ways, marine railways, and lift barges at shipbuilding facilities (or shipyards). Shipbuilding facilities use these structures to maintain, repair, or rebuild existing ships, or perform the final assembly and launching of new ships (including barges). Shipbuilders use these structures to reach surfaces and parts that would otherwise be under water. Because dry docks and similar structures include sumps or containment systems, shipyards can control the discharge of pollutants to surface water. Typical proposed MP&M operations that occur in dry docks and similar structures include: abrasive blasting; hydro-blasting; painting; welding; corrosion preventive coating; floor cleaning; aqueous degreasing; and testing. Not all of these proposed MP&M operations generate wastewater. The proposed subcategory also included wastewater generated when a shipyard cleans a ship's hull in a dry dock (or similar structure) to remove marine life (e.g., barnacles) in preparation for performing proposed MP&M operations.

This subcategory included only process wastewater generated and discharged from proposed MP&M operations inside and outside ships (including bilge water) that occur in or on dry docks or similar structures. The Agency is not including process wastewater from proposed MP&M operations that is generated at other locations at the shipyard ("on-shore" operations) in this proposed subcategory. EPA included these wastewaters from these "on-shore" shipbuilding operations (e.g., electroplating, plasma arc cutting) in the proposed General Metals Subcategory or Oily Wastes Subcategory. Also, EPA is not including wastewater generated onboard ships when they are afloat (i.e., not in dry docks or similar structures). For U.S. military ships, EPA is in the process of establishing standards under the Uniform National

Discharge Standards (UNDS) pursuant to Section 312(n) of the CWA (see 64 FR 25125; May 10, 1999) to regulate discharges of wastewater generated onboard these ships when they are in U.S. waters and are afloat (e.g., at a shipyard's dock).

In addition to wastewater from proposed MP&M operations, three other types of water streams are in or on dry docks and similar structures: flooding water, dry dock ballast water, and stormwater. Flooding water enters and exits the dry dock or similar structure prior to performing any MP&M operations. For example, in a graving dock, the gates are opened, allowing flooding water in and ships to float inside the chamber. Then the flooding water is drained, leaving the ship's exterior exposed so shipyard employees can repair and maintain the ship's hull. Dry dock ballast water serves a similar purpose. It is used to lower (or sink) a floating dry dock so that a ship can float over it. Then the dry dock ballast water is pumped out, raising the dry dock with the ship on top. Flooding water and dry dock ballast water are not directly associated with proposed MP&M operations. Finally, because these structures are located outdoors and are exposed to the elements, stormwater may fall in or on the dry dock or similar structures.

In its evaluation, EPA excluded all three of these water streams (i.e., flooding water, dry dock ballast water, and stormwater) from the proposed definition of process wastewater specific to the Shipbuilding Dry Dock Subcategory. Stormwater at these facilities is covered by EPA's Storm Water Multi-Sector General Permit, similar general permits issued by authorized states, and individual stormwater permits. In general, stormwater permits at shipyards include best management practices (BMPs) that are designed to prevent the contamination of stormwater. For example, these practices include sweeping areas after paint stripping or painting are completed.

Many shipyards perform only dry proposed MP&M operations in their dry docks (and similar structures) or do not discharge wastewater generated in dry docks (and similar structures) from proposed MP&M operations. Many shipyards prefer to handle this wastewater as hazardous, and contract haul it off site due to the possible presence of copper or tin (used as an antifoulant) in paint chips from paint stripping operations. The wastewater discharged from dry docks and similar structures contains relatively low levels of metals and toxic organic pollutants.

EPA estimates that there are nine indirect dischargers and six direct dischargers in the Shipbuilding Dry Dock Subcategory evaluated for the final rule. Many shipbuilders operate multiple dry docks (or similar structures); this is the number of estimated facilities (not dry docks) that discharge process wastewater from proposed MP&M operations at dry docks or similar structures. Facilities in the proposed Shipbuilding Dry Dock Subcategory are specifically not regulated by the final rule (see Section 1.0 and 40 CFR 438.1(e)(5)).

7.0 SELECTION OF POLLUTANT PARAMETERS

This section discusses the criteria EPA used to identify pollutants of concern (POCs) and regulated pollutants. For the final rule, EPA evaluated process wastewater from proposed MP&M operations¹ to determine the presence of priority, conventional, and nonconventional pollutant parameters. EPA reviewed data on 308 metal and organic pollutant parameters listed in The 1990 Industrial Technology Division List of Analytes (1) under the MP&M final rule. These pollutants are listed in Section 3.0, Tables 3-5 and 3-6. The Agency also evaluated regulating 24 conventional and other nonconventional pollutant bulk parameters under the MP&M rule. These pollutants are listed in Section 3.0, Table 3-7.

Section 7.1 discusses the criteria EPA used to identify POCs for the MP&M final rule. POCs are pollutants EPA has identified at significant concentrations in process wastewater from proposed MP&M operations. While EPA generally considers the full list of POCs in its analysis, it regulates only a subset of these pollutants. Section 7.2 presents the criteria EPA used to select the regulated pollutants. Section 7.3 presents the references used in this section.

7.1 Identification of Pollutants of Concern

EPA performed the POC analysis using the analytical data from the Phase I and Phase II sampling programs. The POC analysis identifies those pollutants present in industry wastewater at significant concentrations. These pollutants are evaluated in the pollutant reduction analysis (Section 11.0) and further considered for regulation. To identify POCs for the MP&M rulemaking, EPA analyzed for 329 pollutants in over 1,994 samples of unit operation processes and rinse water, wastewater treatment influent, and wastewater treatment effluent during the Phase I and Phase II sampling programs. EPA did not use data collected during the post-proposal sampling program and industry-supplied data in the POC analysis. The Agency excluded acidity, total alkalinity, and pH from the POC analysis since these pollutant parameters do not have a detection limit.

EPA performed the POC analysis using all data across proposed subcategories evaluated for the final rule. When determining regulated pollutants (Section 7.2), EPA considered proposed subcategory-specific factors. EPA identified POCs primarily using data from proposed MP&M operations (both process baths and rinses) and wastewater treatment influent data. The pollutants generated depend more on the nature of the unit operations than the subcategory in which the operation is performed (e.g., pollutants present in a machinery operation conducted on steel parts will be similar across subcategories). While the oil-bearing subcategories exclude operations generating high concentrations of metal pollutants, EPA still

¹Note: EPA evaluated a number of unit operations for the May 1995 proposal, January 2001 proposal, and June 2002 NODA (see Tables 4-3 and 4-4). However, EPA selected a subset of these unit operations for regulation in the final rule (see Section 1.0). For this section, the term “proposed MP&M operations” means those operations evaluated for the two proposals, NODA, and final rule. The term “final MP&M operations” means those operations defined as “oily operations” (see Section 1.0, 40 CFR 438.2(f), and Appendix B to Part 438) and regulated by the final rule.

detected many metal pollutants in oil-bearing wastewaters (see Section 5.0) and therefore considered these to be POCs.

EPA reduced the list of 329 analyzed pollutants to 132 POCs by retaining only those pollutants that met the following criteria:

- EPA detected the pollutant in at least three samples collected during the MP&M sampling programs. For this evaluation, EPA considered all samples collected from Phase I and Phase II process water, rinse water, wastewater treatment influent, or wastewater treatment effluent.
- The average of all the detected concentrations of the pollutant in samples of wastewater from proposed MP&M operations and treatment system influents was at least five times the minimum level (ML). EPA describes the ML as “the lowest level at which the entire analytical system must give a recognizable signal and an acceptable calibration point for the analyte” (2). EPA evaluated the unit operation, rinse, and treatment influent data to identify those pollutants present in raw wastewater. EPA did not evaluate the effluent data for this step because the treatment systems are designed to remove pollutants, so including effluent data in this step may have artificially lowered the average concentration.
- EPA analyzed the pollutant in a quantitative manner following the appropriate quality assurance/quality control (QA/QC) procedures. Thus, wastewater analyses performed solely for certain semiquantitative “screening” purposes did not meet this criterion, and EPA excluded these results from the POCs analysis. EPA performed these semiquantitative analyses only in unusual cases (e.g., to qualitatively screen for the presence of a rare metal such as osmium).

For the first criterion, EPA combined data from the unit operation, treatment system influent, and treatment system effluent wastewater samples to determine the total number of samples in which each pollutant was detected.

EPA calculated the average detected pollutant concentrations of the unit operation wastewater and treatment system influent samples to determine if the data met the second criterion. In this analysis, EPA focused only on detected pollutants so nondetected pollutants were not included. For pollutants not meeting the second criterion based on this calculation (i.e., the average detected pollutant concentration in samples of unit operation wastewater and treatment system influent samples was less than five times the ML), EPA also calculated the average detected pollutant concentration in the treatment system effluent and determined whether those averages exceeded five times the ML. EPA took this step for two reasons. First, the Agency wanted to identify any pollutants that were generated during treatment. For example, EPA determined that chloroform can be produced in alkaline chlorination systems and adjusted

the pollutant removal model accordingly. Second, matrix interferences associated with unit operation and wastewater treatment influent samples may have masked the presence of a pollutant in a unit operation or influent sample. For six pollutants (1,1-dichloroethene, chloroform, diphenyl ether, isophorone, n-nitrosopiperidine, and trichlorofluoromethane), the average treatment system effluent concentrations exceeded five times the ML. Consequently, EPA considered these compounds POCs.

As explained above, EPA started with a possible list of 329 pollutants. The Agency excluded acidity, total alkalinity, and pH from the POC analysis since these pollutant parameters do not have a detection limit. EPA also excluded oil and grease (EPA Method 413.2) from the POC analysis since oil and grease (as HEM) was included. Therefore, these pollutant parameters were not considered for regulation under the final MP&M rule.

Of the 324 remaining pollutants EPA initially considered regulating under MP&M, EPA excluded 192 as POCs because they failed to meet the following criteria:

- EPA did not detect 113 pollutant parameters in samples collected during the Phase I and Phase II MP&M sampling programs. Table 7-1 lists these pollutants.
- EPA detected 50 pollutants in less than three samples collected during the Phase I and Phase II MP&M sampling programs. Table 7-2 lists these pollutants.
- EPA detected 23 pollutants at average detected concentrations that were less than five times the ML in unit operation wastewater and treatment system influent. Table 7-3 lists these pollutants.
- EPA performed analyses for 42 pollutants, listed in Section 3.0, Table 3-5, using semiquantitative methods for “screening” purposes to determine if these analytes were present. For this screening, the Agency did not use the QA/QC procedures required by analytical method 1620. EPA excluded the six pollutants (strontium, potassium, platinum, sulfur, silicon, and phosphorus) that passed the first three criteria but were part of the screening analysis. Based on the screening results, EPA did not measure for these pollutants in a quantitative manner.

After excluding these pollutants, EPA defined the 132 remaining pollutants as POCs for further evaluation with respect to technology options and the performance of the technologies. These include 47 priority pollutants (34 priority organic pollutants, 13 priority metal pollutants), 3 conventional pollutants, and 82 nonconventional pollutants (50 organic pollutants, 15 metal pollutants, and 17 other nonconventional pollutants). Table 7-4 lists these pollutants, along with the number of times EPA analyzed for and detected each pollutant

Table 7-1

**Pollutants Not Detected in Any Samples Collected During the Phase I and
Phase II MP&M Sampling Programs**

Priority Pollutants	
1,2-Dichloropropane	Benzo(K)Fluoranthene
1,3-Dichlorobenzene	Bis(2-Chloroisopropyl) Ether
2-Chloroethylvinyl Ether	Chrysene
3,3'-Dichlorobenzidine	Dibenzo(A,H)Anthracene
4-Bromophenyl Phenyl Ether	Hexachlorobenzene
4-Chlorophenylphenyl Ether	Hexachlorobutadiene
Acenaphthylene	Hexachlorocyclopentadiene
Benzidine	Hexachloroethane
Benzo(A)Anthracene	Indeno(1,2,3-Cd)Pyrene
Benzo(A)Pyrene	Pentachlorophenol
Benzo(B)Fluoranthene	Trans-1,2-Dichloroethene
Benzo(Ghi)Perylene	Trans-1,3-Dichloropropene
Nonconventional Organic Pollutants	
1,2,3-Trichlorobenzene	2-Nitroaniline
1,2,3-Trichloropropane	2-Phenylnaphthalene
1,2,3-Trimethoxybenzene	2-Propen-1-ol
1,2,4,5-Tetrachlorobenzene	2-Propenenitrile, 2-Methyl-
1,2-Dibromo-3-Chloropropane	3,3'-Dimethoxybenzidine
1,2-Dibromoethane	3,5-Dibromo 4-Hydroxybenzonitrile
1,3-Butadiene, 2-Chloro	3-Chloropropene
1,3-Dichloro-2-Propanol	3-Methylcholanthrene
1,3-Dichloropropane	3-Nitroaniline
1,5-Naphthalenediamine	4,4'-Methylenebis(2-Chloroaniline)
1-Chloro-3-Nitrobenzene	4,5-Methylene Phenanthrene
1-Phenylnaphthalene	4-Chloro-2-Nitroaniline
2,3,4,6-Tetrachlorophenol	5-Nitro-O-Toluidine
2,3,6-Trichlorophenol	7,12-Dimethylbenz(A)Anthracene
2,3-Benzofluorene	Aniline, 2,4,5-Trimethyl-
2,3-Dichloroaniline	Aramite
2,3-Dichloronitrobenzene	Benanthrone
2,4,5-Trichlorophenol	Benzenethiol
2,6-Dichloro-4-Nitroaniline	Biphenyl, 4-Nitro
2,6-Dichlorophenol	Chloroacetonitrile
2-Methylbenzothiazole	Crotonaldehyde
Crotoxypfos	Methyl Methanesulfonate

Table 7-1 (Continued)

Nonconventional Organic Pollutants (continued)	
Diethyl Ether	n-Nitrosodiethylamine
Dimethyl Sulfone	o-Toluidine, 5-Chloro-
Diphenyldisulfide	p-Dimethylaminoazobenzene
Ethyl Cyanide	Pentachlorobenzene
Ethyl Methacrylate	Pentachloroethane
Ethyl Methanesulfonate	Perylene
Hexachloropropene	Phenacetin
Iodomethane	Pronamide
Isosafrole	Squalene
Longifolene	Thioacetamide
Malachite Green	Trans-1,4-Dichloro-2-Butene
Mestranol	Triphenylene
Methapyrilene	Vinyl Acetate
Nonconventional Metal Pollutants	
Cerium	Praseodymium
Erbium	Rhenium
Europium	Samarium
Gadolinium	Scandium
Gallium	Tellurium
Germanium	Terbium
Holmium	Thorium
Indium	Thulium
Iodine	Uranium
Lanthanum	

Source: MP&M Sampling Data.

Table 7-2

**Pollutants Detected in Less Than Three Samples Collected
During the Phase I and Phase II MP&M Sampling Programs**

Priority Pollutants	
1,1,2,2-Tetrachloroethane	2-Chloronaphthalene
1,1,2-Trichloroethane	2-Chlorophenol
1,2,4-Trichlorobenzene	Acrylonitrile
1,2-Dichlorobenzene	Bis(2-Chloroethoxy) Methane
1,2-Dichloroethane	Bis(2-Chloroethyl) Ether
1,2-Diphenylhydrazine	Bromomethane
1,4-Dichlorobenzene	Nitrobenzene
2,4-Dichlorophenol	n-Nitrosodi-n-Propylamine
2,4-Dinitrotoluene	Vinyl Chloride
Nonconventional Organic Pollutants	
1,1,1,2-Tetrachloroethane	Ethylenethiourea
1,2:3,4-Diepoxybutane	n-Nitrosodi-n-Butylamine
1,3,5-Trithiane	n-Nitrosomethylphenylamine
1,4-Dinitrobenzene	o-Anisidine
1,4-Naphthoquinone	p-Chloroaniline
1-Naphthylamine	Pentamethylbenzene
2,6-Di-Tert-Butyl-P-Benzoquinone	Phenothiazine
2-Picoline	p-Nitroaniline
4-Aminobiphenyl	Resorcinol
Beta-Naphthylamine	Safrole
Carbazole	Thianaphthene
Cis-1,3-Dichloropropene	Thioxanthe-9-One
Dibromomethane	Toluene, 2,4-Diamino-
Nonconventional Metal Pollutants	
Dysprosium	Rhodium
Hafnium	Ruthenium
Neodymium	Zirconium

Source: MP&M Sampling Data.

Table 7-3

**Pollutants Detected at Average Concentrations of Less Than Five
Times the Minimum Level During the Phase I and Phase II
MP&M Sampling Programs^a**

Priority Pollutants	
2,4,6-Trichlorophenol	Chloromethane
4,6-Dinitro-o-Cresol	Dibromochloromethane
Benzene	Diethyl Phthalate
Bromodichloromethane	Tribromomethane
Carbon Tetrachloride (Tetrachloromethane)	
Nonconventional Organic Pollutants	
2-(Methylthio)Benzothiazole	n-Nitrosomorpholine
n-Nitrosomethylethylamine	o-Toluidine
Nonconventional Metal Pollutants	
Bismuth	Osmium
Iridium	Palladium
Lithium	Tantalum
Lutetium	Tungsten
Niobium	Ytterbium

Source: MP&M Sampling Data.

^aThe average of all detected concentrations of the pollutants in samples of wastewater from proposed MP&M operations and treatment system influent was less than five times the detection limit.

Table 7-4**Summary of Pollutants of Concern Information**

Pollutant Parameter	Phase I and Phase II Sampling Information			
	No. of Times Analyzed for All Samples ^a	No. of Times Detected for All Samples ^a	Average Concentration in Samples of Unit Operation Wastewater and Treatment System Influent (mg/L) ^a	Minimum Level (mg/L)
Priority Organic Pollutants				
1,1,1-Trichloroethane	1,043	28	0.327	0.01
1,1-Dichloroethane	1,043	7	0.091	0.01
1,1-Dichloroethylene	1,043	3	0.418	0.01
2,4-Dimethylphenol	994	31	0.078	0.01
2,4-Dinitrophenol	946	4	83.7	0.05
2,6-Dinitrotoluene	1,029	3	2.73	0.01
2-Nitrophenol	1,021	9	0.394	0.02
4-Chloro-m-cresol	1,003	95	260	0.01
4-Nitrophenol	969	5	2.99	0.05
Acenaphthene	1,029	6	0.332	0.01
Acrolein	1,003	5	0.307	0.05
Anthracene	1,029	4	0.117	0.01
Bis(2-Ethylhexyl) Phthalate	1,028	211	4.15	0.01
Benzyl Butyl Phthalate	1,026	16	1.08	0.01
Chlorobenzene	1,043	7	0.282	0.01
Chloroethane	1,043	4	4.22	0.05
Chloroform	1,043	331	0.049	0.01
Di-N-Butyl Phthalate	1,026	41	0.352	0.01
Di-N-Octyl Phthalate	1,028	18	1.58	0.01
Dimethyl Phthalate	994	3	0.739	0.01
Ethylbenzene	1,043	61	0.165	0.01
Fluoranthene	1,028	4	0.132	0.01
Fluorene	1,029	18	0.956	0.01
Isophorone	996	3	.056	0.01
Methylene Chloride	1,043	52	0.403	0.01
n-Nitrosodimethylamine	996	3	3.68	0.05
N-Nitrosodiphenylamine	1,029	15	1.14	0.02
Naphthalene	1,029	71	0.638	0.01

Table 7-4 (Continued)

Pollutant Parameter	Phase I and Phase II Sampling Information			
	No. of Times Analyzed for All Samples ^a	No. of Times Detected for All Samples ^a	Average Concentration in Samples of Unit Operation Wastewater and Treatment System Influent (mg/L) ^a	Minimum Level (mg/L)
Priority Organic Pollutants (continued)				
Phenanthrene	1,029	45	0.500	0.01
Phenol	1,021	244	10.1	0.01
Pyrene	1,028	5	0.219	0.01
Tetrachloroethene	1,043	23	0.210	0.01
Toluene	1,043	83	0.230	0.01
Trichloroethylene	1,042	40	0.092	0.01
Priority Metal Pollutants				
Antimony	1,956	606	6.12	0.02
Arsenic	1,972	627	0.178	0.01
Beryllium	1,972	301	0.147	0.005
Cadmium	1,972	873	244	0.005
Chromium	1,972	1,480	1,029	0.01
Copper	1,972	1,752	495	0.025
Lead	1,972	911	30.0	0.05
Mercury	1,970	321	0.0014	0.0002
Nickel	1,972	1,518	356	0.04
Selenium	1,956	317	0.137	0.005
Silver	1,972	698	0.531	0.01
Thallium	1,956	206	0.065	0.01
Zinc	1,971	1,691	188	0.02
Conventional Pollutants				
BOD 5-Day (Carbonaceous)	1,005	757	2,015	2
Oil and Grease (as HEM)	1,028	554	2,308	5
Total Suspended Solids	1,959	1,563	1,007	4
Nonconventional Organic Pollutants				
1,4-Dioxane	1,003	33	0.854	0.01
1-Bromo-2-Chlorobenzene	989	8	0.233	0.01
1-Bromo-3-Chlorobenzene	989	6	0.135	0.01
1-Methylfluorene	989	24	0.347	0.01
1-Methylphenanthrene	989	29	0.581	0.01
2-Butanone	1,003	160	1.59	0.05

Table 7-4 (Continued)

Pollutant Parameter	Phase I and Phase II Sampling Information			
	No. of Times Analyzed for All Samples ^a	No. of Times Detected for All Samples ^a	Average Concentration in Samples of Unit Operation Wastewater and Treatment System Influent (mg/L) ^a	Minimum Level (mg/L)
Nonconventional Organic Pollutants (continued)				
2-Hexanone	1,003	7	1.26	0.05
2-Isopropyl-naphthalene	989	6	3.21	0.01
2-Methylnaphthalene	989	61	0.775	0.01
2-Propanone	1,003	593	3.14	0.05
3,6-Dimethylphenanthrene	989	13	1.24	0.01
4-Methyl-2-Pentanone	1,003	91	5.19	0.01
Acetophenone	989	10	0.159	0.01
Alpha-Terpineol	978	133	13.6	0.01
Aniline	989	19	0.684	0.01
Benzoic Acid	989	202	277	0.05
Benzyl Alcohol	989	61	1.23	0.01
Biphenyl	989	23	0.174	0.01
Carbon Disulfide	1,003	63	0.408	0.01
Dibenzofuran	989	4	0.055	0.01
Dibenzothiophene	988	6	0.240	0.01
Diphenyl Ether	989	5	0.047	0.01
Diphenylamine	989	14	0.704	0.02
Hexanoic Acid	989	237	15.2	0.01
Isobutyl Alcohol	1,003	19	0.167	0.01
m+p Xylene	595	31	0.159	0.01
m-Xylene	408	21	0.498	0.01
Methyl Methacrylate	1,003	6	0.396	0.01
n,n-Dimethylformamide	989	63	0.193	0.01
n-Decane	989	67	2.10	0.01
n-Docosane	989	108	3.47	0.01
n-Dodecane	989	125	13.8	0.01
n-Eicosane	988	156	3.30	0.01
n-Hexacosane	989	95	5.84	0.01
n-Hexadecane	989	168	6.27	0.01
n-Nitrosopiperidine	989	4	0.020	0.01
n-Octacosane	989	40	7.45	0.01

Table 7-4 (Continued)

Pollutant Parameter	Phase I and Phase II Sampling Information			
	No. of Times Analyzed for All Samples ^a	No. of Times Detected for All Samples ^a	Average Concentration in Samples of Unit Operation Wastewater and Treatment System Influent (mg/L) ^a	Minimum Level (mg/L)
Nonconventional Organic Pollutants (continued)				
n-Octadecane	989	174	5.74	0.01
n-Tetracosane	988	90	4.13	0.01
n-Tetradecane	989	158	12.7	0.01
n-Triacontane	988	55	2.69	0.01
o+p Xylene	408	30	0.256	0.01
o-Cresol	989	16	0.067	0.01
o-Xylene	595	40	0.058	0.01
p-Cresol	989	82	0.293	0.01
p-Cymene	989	21	0.988	0.01
Pyridine	989	37	0.920	0.01
Styrene	989	9	0.261	0.01
Trichlorofluoromethane	1,043	12	0.049	0.01
Tripropyleneglycol Methyl Ether	989	141	190	0.01
Nonconventional Metal Pollutants				
Aluminum	1,972	1,520	166	0.2
Barium	1,972	1,651	1.75	0.2
Boron	1,913	1,645	85.0	0.1
Calcium	1,972	1,929	68.4	5
Cobalt	1,972	640	12.8	0.05
Gold	161	104	16.2	1
Iron	1,972	1,743	777	0.1
Magnesium	1,972	1,803	53.8	5
Manganese	1,972	1,620	43.4	0.015
Molybdenum	1,972	1,091	2.97	0.01
Sodium	1,972	1,953	3,384	5
Tin	1,912	850	153	0.03
Titanium	1,913	949	32.6	0.005
Vanadium	1,972	504	5.31	0.05
Yttrium	1,913	306	0.061	0.005

Table 7-4 (Continued)

Pollutant Parameter	Phase I and Phase II Sampling Information			
	No. of Times Analyzed for All Samples ^a	No. of Times Detected for All Samples ^a	Average Concentration in Samples of Unit Operation Wastewater and Treatment System Influent (mg/L) ^a	Minimum Level (mg/L)
Other Nonconventional Pollutants				
Amenable Cyanide	160	128	44.3	0.02
Ammonia As Nitrogen	689	569	385	0.05
Chemical Oxygen Demand (COD)	1,461	1,343	11,289	5
Chloride	677	631	5,526	1
Fluoride	688	618	301	0.1
Hexavalent Chromium	1,074	268	1.78	0.01
Sulfate	1,171	1,086	7,046	1
Total Cyanide	406	327	2,072	0.02
Total Dissolved Solids	1,953	1,948	21,883	10
Total Kjeldahl Nitrogen	661	572	606	1
Total Organic Carbon (TOC)	997	838	3,385	1
Total Petroleum Hydrocarbons (as SGT-HEM)	1,016	350	841	5
Total Phosphorus	500	452	170	0.01
Total Recoverable Phenolics	1,357	871	11.7	0.05
Total Sulfide	215	80	6.50	1
Weak-Acid Dissociable Cyanide	72	62	19.4	0.002
Ziram	31	22	1.41	0.01

Source: MP&M Sampling Data.

^aCounts and average based on Phase I and Phase II sampling results. Sample concentrations less than the ML were not included in the average.

parameter in samples of the unit operation wastewater or treatment system influent. Table 7-4 also presents the average concentration at which each pollutant was detected. The Agency did not use sample concentrations reported as less than the ML in calculating the average.

7.2 Regulated Pollutants

EPA determined the pollutants for potential regulation on a subcategory basis. As a first step in selecting the pollutants, the Agency grouped the proposed MP&M subcategories (discussed in Section 6.0) according to whether the facilities in the proposed subcategory generated wastewater with high metals content (metal-bearing) or wastewater with low metals content and high oil and grease content (oil-bearing). The proposed General Metals, Metal Finishing Job Shops, Printed Wiring Board, Non-Chromium Anodizing, and Steel Forming and Finishing Subcategories generate metal-bearing wastewaters, while the Oily Wastes Subcategory

and the proposed Railroad Line Maintenance and Shipbuilding Dry Dock Subcategories generate only oil-bearing wastewaters.

Then, EPA evaluated the concentrations and prevalence of the POCs in the unit operations (baths and rinses) and treatment system influents for each subcategory. EPA also evaluated the effectiveness of the selected treatment technologies for each option (see Section 9.0) to determine which pollutants were effectively removed by these technologies. Using this information, EPA considered the following factors in determining which pollutants should not be further considered for regulation:

- The pollutant is controlled through the regulation of other pollutants. EPA evaluated wastewater treatment data to determine if control of one parameter would also control other pollutants. For example, most metal POCs are effectively removed by chemical precipitation. Control of the metals predominantly detected in process wastewater from proposed MP&M operations also controls those other metals not as common in process wastewater from proposed MP&M operations. Therefore, EPA considered only a subset of metals for regulation. In addition, many organic pollutants detected in process wastewater from proposed MP&M operations are removed in oil/water separation systems in the oil phase of the wastewater. Therefore, controlling the oil and grease bulk parameter effectively controls these organic pollutants.
- The pollutant is present in only trace amounts in the subcategory's wastewater type (metal-bearing or oil-bearing) and/or is not likely to cause toxic effects. EPA performed this evaluation on a pollutant-by-pollutant basis using the data presented in Section 5.0.
- The pollutant may be used as a treatment chemical.
- The pollutant is not controlled by the selected BPT/BAT technologies. EPA reviewed the treatment data for technologies considered in the MP&M technology options (see Section 9.0), and identified any pollutants that were not effectively removed by these technologies.

Based on these criteria, a number of these pollutants were not further considered for regulation. Based on other factors, EPA established limitations and standards for direct dischargers in the Oily Wastes Subcategory only. For that subcategory, the list of remaining POCs was reduced for the purpose of setting limitations and standards to oil and grease (as HEM) and TSS. Table 7-5 lists all of the remaining POCs and the reason each pollutant was eliminated.

EPA determined that regulating only oil and grease will control the removal of organic constituents for the Oily Wastes Subcategory. EPA did not promulgate a limit for total

petroleum hydrocarbons (TPH) (as SGT-HEM) because it believes that regulating oil and grease (as HEM) will control the discharge of TPH (as SGT-HEM).

EPA determined that it was not necessary to promulgate limits for 28 POCs that are present in only trace amounts in the Oily Wastes Subcategory and/or are not likely to cause toxic effects. As shown in Table 5-4, the median concentration at the influent to treatment for most of these metals is less than 0.5 mg/L.

EPA did not select aluminum, calcium, iron, magnesium, manganese, sodium, chloride, sulfate, or total sulfide for regulation in the Oily Wastes Subcategory because they may be used as treatment chemicals by facilities in the Oily Wastes Subcategory.

EPA did not select lead, zinc, barium, boron or total phosphorus for regulation in the Oily Wastes Subcategory because they are not controlled by the selected BPT/BAT technology.

7.3 References

1. U.S. Environmental Protection Agency. The 1990 Industrial Technology Division List of Analytes. Washington, DC, May 1990.
2. U.S. Environmental Protection Agency. Development Document for Final Effluent Limitations Guidelines and Standards for the Centralized Waste Treatment Industry. (EPA-821-R-00-020), 2000.

Table 7-5

Pollutants Considered for Regulation for Direct Dischargers in the Oily Wastes Subcategory

Pollutant Parameter	Controlled Through Regulation of Other Pollutants	Present in Trace Amounts or Not Likely to Cause Toxic Effects	Treatment Chemical	Not Controlled by BPT/BAT Technology	Regulated Under 40 CFR 438
Priority Organic Pollutants					
1,1,1-Trichloroethane	✓				
1,1-Dichloroethane	✓				
1,1-Dichloroethylene	✓				
2,4-Dimethylphenol	✓				
2,4-Dinitrophenol	✓				
2,6-Dinitrotoluene	✓				
2-Nitrophenol	✓				
4-Chloro-m-cresol	✓				
4-Nitrophenol	✓				
Acenaphthene	✓				
Acrolein	✓				
Anthracene	✓				
Bis(2-Ethylhexyl) Phthalate	✓				
Benzyl Butyl Phthalate	✓				
Chlorobenzene	✓				
Chloroethane	✓				
Chloroform	✓				
Di-N-Butyl Phthalate	✓				
Di-N-Octyl Phthalate	✓				
Dimethyl Phthalate	✓				
Ethylbenzene	✓				
Fluoranthene	✓				
Fluorene	✓				
Isophorone	✓				
Methylene Chloride	✓				
n-Nitrosodimethylamine	✓				
N-Nitrosodiphenylamine	✓				
Naphthalene	✓				
Phenanthrene	✓				

Table 7-5 (Continued)

Pollutant Parameter	Controlled Through Regulation of Other Pollutants	Present in Trace Amounts or Not Likely to Cause Toxic Effects	Treatment Chemical	Not Controlled by BPT/BAT Technology	Regulated Under 40 CFR 438
Priority Organic Pollutants (continued)					
Phenol	✓				
Pyrene	✓				
Tetrachloroethene	✓				
Toluene	✓				
Trichloroethylene	✓				
Priority Metal Pollutants					
Antimony		✓			
Arsenic		✓			
Beryllium		✓			
Cadmium		✓			
Chromium		✓			
Copper		✓			
Lead				✓	
Mercury		✓			
Nickel		✓			
Selenium		✓			
Silver		✓			
Thallium		✓			
Zinc				✓	
Conventional Pollutants					
BOD 5-Day (Carbonaceous)	✓				
Oil and Grease (as HEM)					✓
Total Suspended Solids					✓
Nonconventional Organic Pollutants					
1,4-Dioxane	✓				
1-Bromo-2-Chlorobenzene	✓				
1-Bromo-3-Chlorobenzene	✓				
1-Methylfluorene	✓				
1-Methylphenanthrene	✓				
2-Butanone	✓				
2-Hexanone	✓				
2-Isopropylnaphthalene	✓				
2-Methylnaphthalene	✓				
2-Propanone	✓				

Table 7-5 (Continued)

Pollutant Parameter	Controlled Through Regulation of Other Pollutants	Present in Trace Amounts or Not Likely to Cause Toxic Effects	Treatment Chemical	Not Controlled by BPT/BAT Technology	Regulated Under 40 CFR 438
Nonconventional Organic Pollutants (continued)					
3,6-Dimethylphenanthrene	✓				
4-Methyl-2-Pentanone	✓				
Acetophenone	✓				
Alpha-Terpineol	✓				
Aniline	✓				
Benzoic Acid	✓				
Benzyl Alcohol	✓				
Biphenyl	✓				
Carbon Disulfide		✓			
Dibenzofuran	✓				
Dibenzothiophene	✓				
Diphenyl Ether	✓				
Diphenylamine	✓				
Hexanoic Acid	✓				
Isobutyl Alcohol	✓				
m+p Xylene	✓				
m-Xylene	✓				
Methyl Methacrylate	✓				
n,n-Dimethylformamide	✓				
n-Decane	✓				
n-Docosane	✓				
n-Dodecane	✓				
n-Eicosane	✓				
n-Hexacosane	✓				
n-Hexadecane	✓				
n-Nitrosopiperidine	✓				
n-Octacosane	✓				
n-Octadecane	✓				
n-Tetracosane	✓				
n-Tetradecane	✓				
n-Triacontane	✓				
o+p Xylene	✓				
o-Cresol	✓				
o-Xylene	✓				

Table 7-5 (Continued)

Pollutant Parameter	Controlled Through Regulation of Other Pollutants	Present in Trace Amounts or Not Likely to Cause Toxic Effects	Treatment Chemical	Not Controlled by BPT/BAT Technology	Regulated Under 40 CFR 438
Nonconventional Organic Pollutants (continued)					
p-Cresol	✓				
p-Cymene	✓				
Pyridine	✓				
Styrene	✓				
Trichlorofluoromethane	✓				
Tripropyleneglycol Methyl Ether	✓				
Nonconventional Metal Pollutants					
Aluminum			✓		
Barium				✓	
Boron				✓	
Calcium			✓		
Cobalt		✓			
Gold		✓			
Iron			✓		
Magnesium			✓		
Manganese			✓		
Molybdenum		✓			
Sodium			✓		
Tin		✓			
Titanium		✓			
Vanadium		✓			
Yttrium		✓			
Other Nonconventional Pollutants					
Amenable Cyanide		✓			
Ammonia As Nitrogen		✓			
Chemical Oxygen Demand (COD)	✓				
Chloride			✓		
Fluoride		✓			
Hexavalent Chromium		✓			
Sulfate			✓		
Total Cyanide		✓			
Total Dissolved Solids		✓			
Total Kjeldahl Nitrogen		✓			

Table 7-5 (Continued)

Pollutant Parameter	Controlled Through Regulation of Other Pollutants	Present in Trace Amounts or Not Likely to Cause Toxic Effects	Treatment Chemical	Not Controlled by BPT/BAT Technology	Regulated Under 40 CFR 438
Other Nonconventional Pollutants (continued)					
Total Organic Carbon (TOC)	✓				
Total Petroleum Hydrocarbons (as SGT-HEM)	✓				
Total Phosphorus				✓	
Total Recoverable Phenolics	✓				
Total Sulfide			✓		
Weak-Acid Dissociable Cyanide		✓			
Ziram		✓			